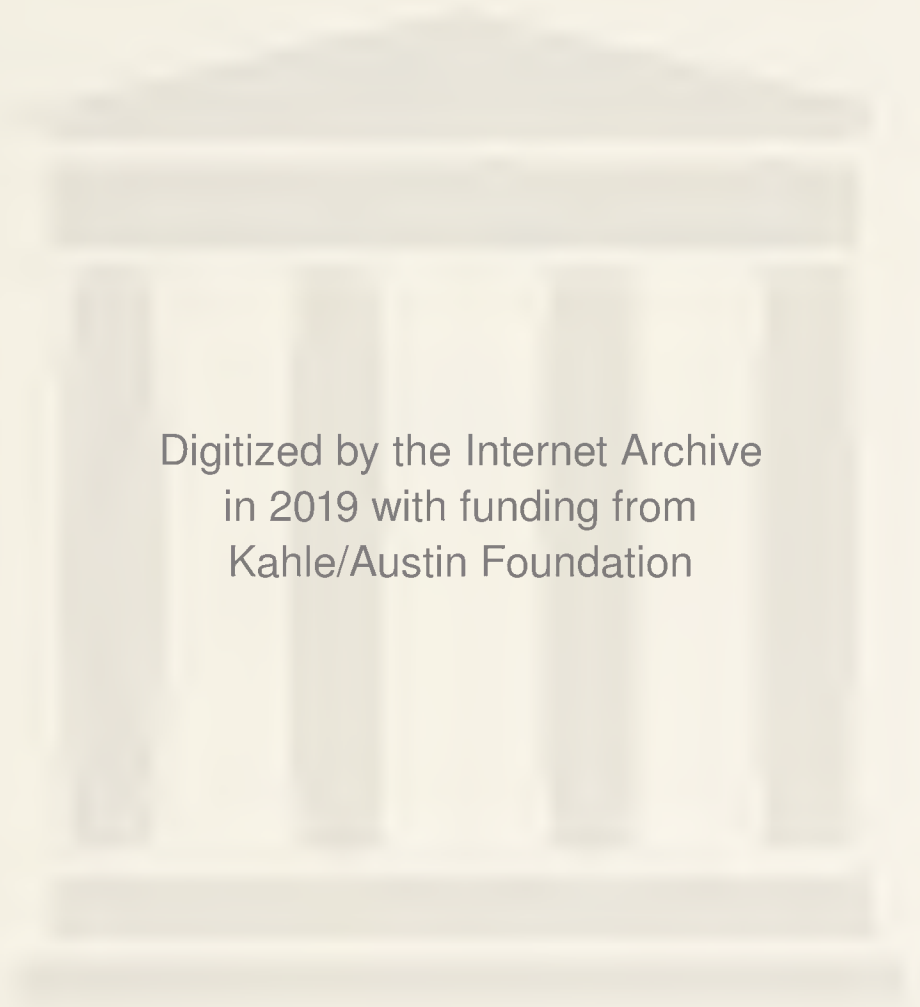

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Comparative ethnographical studies.

8.

"MODIFICATIONS IN INDIAN CULTURE THROUGH INVENTIONS AND LOANS"

"E
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N83"

by

Erland Nordenskiöld

GÖTEBORG 1930
ELANDERS BOKTRYCKERI AKTIEBOLAG

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TO THE MEMORY OF MY FATHER.

13947

PREFACE.

The publication of the present volume, Part 8 of my "Series", has been rendered possible through the financial support so generously given by Messrs. H. Lindquist and Knut J:son Mark, to both of whom I herewith wish to express my sincere gratitude. Thus, by this very real assistance, it has again been possible to publish some of the results of the ethnographical researches that have been carried out at the Gothenburg Museum, whereby the collections of the Museum in a special way will be brought within reach of international science. By this means the Museum will become more widely known and acquire new and valuable connections, which in its turn will surely, though indirectly, tend to contribute to improve the collections.

The personal obligations I am under are many, but among them particular acknowledgment is due to Dr. Kaj Birket-Smith for a number of items of scientific information.

For the translation into English of my Swedish manuscript I have to thank Mr. M. Leijer. Beside my translator I have had assistance from Miss A-L. Mannheimer in the reading of the proof-sheets; my son Nils has done the typing, and Mr. Hjelm has made the drawings. To each of the above I feel great pleasure in acknowledging my obligation.

Gothenburg in February, 1930.

Erland Nordenskiöld.

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INTRODUCTION.

In the following pages an attempt will be made to elucidate, by means of examples from America, one of the more — not to say the most — important problems of ethnographical science, viz. that of independent inventions and culture loans. As we all know, this is a much discussed problem, and the attitude taken towards it has mostly proved a matter of opinion. (1) To some researchers it is evidently placed beyond any doubt whatever that man exceedingly rarely, if ever, has made the same invention twice. When, e. g., we meet with the signalling gong both in America and in the Old World, according to their view the Indians must have learnt its use from the latter, whilst to other investigators it appears quite natural that in different parts of the world the same invention has been made many times over.

Many students opine that a certain invention cannot have been made more than once because of its complex and difficult nature, whilst regarding another as being so easy and simple that it might quite well have been accomplished at different times and places. This subjective view is of course capable of being varied in all possible ways. As a matter of fact, no doubt every open-minded investigator has his own particular opinion as regards primitive man's capacity as an inventor.

So as to get a real grasp of the abovementioned controversy, I have in the following tried to review what we *actually know* in regard to independent inventions and culture loans in America, and it is on the basis of these studies that I shall attempt a summing-up.

To that end I shall endeavour, so far as it is possible by way of concrete instances, to show how inventions have been made — or apparently have been made — by the Indians.

I shall also try to coordinate what we know of loans between the Indian tribes themselves, of loans by the Indians

Fig. 1. Huari woman. Matto Grosso. These Indians are the only primitive people in South America, with a knowledge of the chain.

from the whites and the negroes, of circumstances under which culture elements have spontaneously spread, of the part played by migrations in the dissemination of culture elements, and of the stability of the migrating peoples' own culture. Also of conditions tending to create or preclude a demand for certain culture elements. My aim will be to avoid showing that personally I hold one view or the other, even in cases where I possess a subjective opinion

— a thing which I naturally cannot escape having. My object is to express nothing that is not purely objective. In my view it is better to be satisfied with small results that are sure than propounding wider ones that are uncertain. I do not wish to draw conclusions from facts before I know their true value. Thus I have purposely avoided to express any definite opinion as regards questions concerning Malayo-Polynesian or Asiatic influence in America. I have only attempted to adduce facts calculated to throw light upon the value of certain more or less theoretical speculations as regards pre-Columbian cultural intercourse between the Old and the New World.

Examples illustrating how culture elements spread from one people to another are obtainable from historical times, and when it comes to America we are enabled to study the positive influence of the whites, as well as of the negroes, upon the Indians. We can also study the culture loans that have come into being in connection with the migrations of Indian tribes of whom we possess historical records. We can arrive at an idea of the Indians' inventive capability by way of a coordination of such inventions as necessarily have been made by them because of their only occurring in America at the time of the Discovery.

Generally speaking, it is on the question whether identical culture elements occurring in the New and the Old World are explainable as independent inventions in two or more different places or as culture loans, that the opinions of Americanists are so divergent. This is quite a mistaken limitation of the problem. Graebner (2) is certainly right when he remarks that those who believe the same invention to have been made at different times, are inconsistent when they hold that this can only have happened when the invention occurs in two areas separated from each other, whilst they consider that the invention has only been made once when it is a case of a connected area. For of course an invention may just as well have been made

twice although its area of distribution at the present time is a connected whole.

The same invention may, for instance, in one part of America be a culture loan from the Old World, whilst in some other part it is an independent invention, or an earlier loan from the Old World, but nevertheless the area of distribution may by now have become a connected whole. A cultural element of this kind is for example the membrane drum which in large tracts of America is of pre-Columbian origin whilst in other parts it has been introduced by whites and negroes. (3)

In order to be able to make use of the culture elements in investigation of the kind I am here dealing with, one must necessarily possess a thorough knowledge of their variations as to form, of their distribution, and of all data that otherwise are obtainable from ethnology or archaeology. It is also necessary clearly to understand to what extent their distribution may, or may not, be due to natural surroundings and physical conditions. A study like the one here before the reader must therefore contain — beside a general review — special investigation of the culture elements that are referred to in that review, unless such special studies have already been published. This treatise will thus embody both a discussion of the problems in general and a number of minor articles on different culture elements referred to the general discussion, detailed studies without which the latter would be of little or no value.

Although rather a delicate point, I must, before proceeding further, explain what I mean when I use the word invention. Every little improvement as regards a weapon or implement — even certain modifications for the worse — are inventions, but it is necessary to fix upon some definite terminology in order to differentiate between these and what are properly speaking inventions. With Harrison, (4) I am inclined to define "invention" as being a forward

leap in development, as distinguished from improvements or emending modifications capable of being effected by degrees. It is only seldom it is possible typologically to trace the evolution of inventions, but this can frequently be done in the case of improvements or modifications. I will here give a few examples of inventions: Quipus are an invention, and the introduction of the decimal system in connection with quipus is also an invention. This we cannot conceive but as a distinct leap in human progress. The club-headed digging stick — weighted with stone — is an invention. It is inconceivable that inventions of this kind have come into being by successive stages. Each modification of the form of the stone head or the handle may have resulted from a gradual process of improvement or deterioration. When for the first time the roof-apex of a circular hut was covered with a clay vessel, that was an invention. All subsequent modifications of the form of the clay vessel may have been made gradually and have the character of improvements. Whilst the pincers are an invention, all changes and improvements in the form and material of the pincers are improvements or deteriorations. Tie-dyeing is an invention, different methods of applying the binding for the purpose of obtaining different effects being nothing but variants. Signalling by beating on a hollow log of wood is an invention. Modifications of the form of the log in order to strengthen or vary the sound are mere improvements. The hammock is an invention, but all improvements as to its form are modifications. Bronze, i.e. the alloying of tin with copper, is an invention, whilst varying the proportions between tin and copper are improvements or deteriorations. The pellet-bow is an invention, variations as to the shape of the pellet-holder are modifications. The blowgun as a weapon is an invention, whilst different forms of it are modifications.

In practice it is naturally very difficult to maintain the

distinction between inventions and modifications that I have here outlined. It is nevertheless useful to bear it in mind.

We should also endeavour to distinguish between discoveries and inventions, although in practice this is often very difficult. When the Indians discover a plant of which the bast can be made into cords, it is a discovery, whilst every implement used in the preparation of the bast is an invention, as is also every article manufactured from that bast. Bark cloth, for example, is both a discovery and an invention. The bark suitable for making cloth has been discovered, and the idea of utilizing it for making cloth is an invention.

Before going any further I strongly wish to emphasize that the present work only deals with the Indians of America — in particular those of South America — and what applies to them is not always applicable to every other people. I think it quite a mistake to try and explain instances of Indian culture by parallels, e.g. from the negroes of the Congo. Because, e.g., a newly introduced culture element among the latter may spread with great rapidity it by no means follows that it does the same among the Indians, with their conservatism. A still greater mistake is any endeavour to illustrate primitive culture by means of examples from modern civilization. This does not, however, prevent that this work should, methodologically, prove to be of some interest to those who are studying inventions and culture loans in other parts of the world.

Before beginning on the first chapter I wish to emphasize that a study like the one I am here placing before the reader ought to be valuable inasmuch as it focusses our attention upon the collating of material from viewpoints that so far have not been sufficiently taken account of. For the study of culture loans and minor inventions the influence of the whites, for example, on primitive tribes is of great importance. Objects originating from a primitive people, who no

longer exist in their pristine condition but have changed owing to influence from the whites, are however more or less at a discount with many collectors. For my own part I am prepared to confess that, e.g., I have not always given due appreciation to such objects as the Indians have manufactured from old scrap iron and such like, objects which nevertheless offer much that is interesting, seeing that they show how primitive man utilizes a raw material which is new to him. These products also tend to convey to us an idea as to his more or less marked conservatism.

Fig. 2. Vessel from Chicama, Peru. The man is holding an enema syringe(?) between his hands. G. M. 21.7.27. ($\times 1/3$.)

CHAPTER I.

Culture elements known to the Indians but unknown in the Old World prior to the discovery of America.

I shall now proceed to discuss Indian inventions in some detail. It should be of interest, I think, to begin by pointing out what must have been invented and discovered by the Indians themselves for the simple reason that it was unknown in the Old World prior to the discovery of America. By this we shall obtain a very fair picture of the Indians' capacity as discoverers and inventors. After that we may well ask ourselves whether it is not possible that the Indians, who have discovered and invented so many things that were unknown among the variegated cultures of the Old World, might have been capable of hitting upon something or other that also was known there. It is a question that to me, at any rate, appears in a high degree pertinent.

In the first place, then, we may consider the cultivation of all the purely American cultivated plants. These the Indians must have found in their wild state and by degrees brought under cultivation. These plants, as we know, are very numerous, and I shall confine myself to mentioning only the most important ones. They are, generally speaking, quite well known, (5) but in this connection it is necessary that I should mention them, however briefly.

Of outstanding importance is maize. At the time when America was discovered, this plant was being cultivated in a great number of varieties all the way from central Chile to 55° of northern latitude. A good many of the implements that were used in connection with the cultivation of maize, such as grinding stones on three feet, husking pins, etc., are probably Indian inventions. Most dishes prepared from maize must also be of Indian origin, as well as different methods of storing maize.

As I have already indicated, the cultivation of maize is of exceedingly wide range in America, and the Indians have found out how to adapt the method of cultivating this American plant according to the varying climatic conditions. Among other things, in Peru and in south-western North America, for example, there were in pre-Columbian times very large-scaled irrigation constructions with important canal systems. As to whether the idea of these is native to America is a question that I for the present prefer to leave unanswered.

Next to maize, manioc is the most important of the cultivated plants of the New World. The Indians cultivate both a non-poisonous and a poisonous variety of manioc. In this case the Indians have made a very remarkable invention in that they have discovered how to eliminate the deadly Prussic acid from the manioc roots, and then use them for food. It thus follows that the Indians must have invented that most peculiar straining bag of basketwork

by means of which the poison is squeezed out, and also the various kinds of graters that are used for reducing the manioc to pulp. (fig. 19). Of the former there are two varieties, and of the latter many different types. To these I shall recur.

Fig. 3. Pronged cigar-holder from the Desana, Northwestern Brazil (×1/8.) G. M. 25. 6. 149.

Another very remarkable thing is the Indian invention of utilizing the juice squeezed out of the manioc for preserving meat against putrefaction in a tropical climate. The entire process of manioc culture must have been invented by the Indians, as for example the method of cultivating the manioc in small earth mounds in which the roots are protected from being flooded by water in the rainy season.

A plant very important to the Indians of the Andes in pre-Columbian time was — and still is — the potato. The Aymara Indians of Bolivia distinguish between no less than 240 different varieties of potato. The method of preserving potatoes by freezing and drying in the sun, for preparing so-called "Chuño", must be an Indian invention. (6)

Other important food plants that we have received from the Indians are our common beans, ground-nuts, Jerusalem artichoke, sunflower, cocoa, quinua, etc. These, and many others, have been discovered by the Indians.

The tobacco plant is one of the most well known Indian discoveries, as well as smoking, snuff-taking and chewing. Thus we see that snuff, cigarettes, cigars, pronged cigarholders (fig. 3) and tobacco pipes are Indian inventions. If we study all the different kinds of Indian pipes in America we shall find that they vary most considerably as to shape, and that in this department the Indians have achieved quite a number of more or less ingenious inventions, as e.g. the use of a

filter for draining off the tobacco juice. It is possible in America to note down the evolution of a number of pipe types from the simple tubular pipe (7).

The coca bush, from which we obtain cocaine, also hails from America. All of the very complicated cultivation of the coca bush must have been tried out by the Indians, just as they have discovered the remarkable qualities of the coca leaves. Coca is chewed together with ashes or lime, and in this we meet with a noteworthy parallel in betel-chewing. Therefore we are unable to declare, off-hand, that the idea of chewing coca together with lime was invented in America independently of influences from Oceania, among other things because the receptacles for the lime in America and Melanasia are so strikingly similar, and in addition they are even made from calabash (Lagenaria), i.e. one of the few cultivated plants that probably were common to the Old and the New Worlds in pre-Columbian time.

The cultivation of agave, from which the Indians produce a beverage called pulque, is also an Indian element. Cocoa, too, is another of the important cultivated plants that we have originally obtained from the Indians. In pre-Columbian times the Indians drank cocoa unsweetened, or sweetened with honey.

Among textile plants cultivated in America, cotton is the most important, and it was known to the Indians in pre-Columbian times. At that time the species of cotton that were cultivated in America were different from those that were cultivated in the Old World before the Discovery. Hence we cannot of course know whether the spinning of thread or the art of weaving cloth were independently invented by the Indians.

The Indians of America cultivate a spice plant, Spanish pepper (Cayenne pepper), which is of the greatest importance to them. They have discovered that by the burning of this pepper there is developed a sort of "poison gas"

which proves effective in laying siege to villages fortified by palisades (8).

The great majority of Indian cultivated plants are tropical or sub-tropical, and must in the first instance have been discovered in Central America or in the tropical section of South America. In this department the achievement contributed by the North American Indians north of Mexico is inconsiderable. Of the above mentioned really important plants tobacco is the only one that possibly may have originated there. Among the less important ones the sunflower and the Jerusalem artichoke derive their origin from North America.

If we knew the history of the American cultivated plants, then we should know the history of the Indians from very far back in time. Of course the Indians did not discover all the cultivated plants at the same time or in the same place. As has been shown by Guernsey and Kidder (9), certain North American basketmakers were acquainted with maize but not with beans, and it is probable that also in South America beans were disseminated much later than maize, as is evident from so many Indian tribes possessing their own words for maize whilst having borrowed the names for beans from Quichua and Guarani. Cotton appears to have been originally propagated by means of the migrations of the Caribs and the Guarani tribes (10). The following important plants were probably cultivated everywhere in America where there were agriculturists, and where their cultivation was possible from climatic conditions.

Maize, Sapallo (Cucurbita — pumpkins), tobacco.

The following important plants have not attained their widest possible distribution: beans, sweet potatoes, cotton, potatoes, Lagenaria (bottle gourd), manioc, cocoa and coca.

There are many wild-growing plants that the Indians have put to use for different purposes, and in this province they have made a number of important inventions. It is to Indians that credit is due for the discovery of the rubber

plant and its utilization in the form of rubber balls, enema syringes, water-proof fabric, elastic rings (11) etc (fig. 4). It is a matter of fact that in pre-Columbian times the Indians were acquainted with all the qualities that make rubber so valuable in modern industry. No corresponding discovery had ever been made in the Old World prior to the discovery of America, in spite of the fact that both in Asia and Africa there are found rubber trees of various kinds.

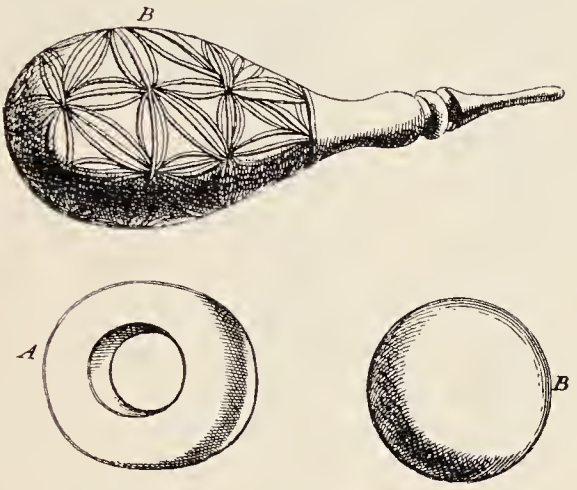


Fig. 4. Enema syringe, rubber ball, and elastic ring from the Indians of Guiana and the Amazon region. (After Barrere).

The Indians have discovered a number of poisons, among others the terrible curare poison which they produce from certain Strychnos varieties, including Strychnos toxifera, and principally use for their blowgun darts. A horrible cardiac poison is obtained by the Chocó Indians from a tree called pakurú-neará (12). These Indians also produce a very virulent arrow poison from the secretions of a certain frog (13).

In addition to cultivated narcotic plants, the Indians know several wild-growing ones, as for instance parica (Piptadenia). They have invented curious tubes which

they use in snuffing up powdered parica seeds, whereby a strongly intoxicating effect is produced (14). They are also known to have used parica for intoxicating enema injections (See Appendix 1). Guarana, peyote (a kind of cactus) and Paraguay tea (maté) have also been discovered by Indians.

The Indians possessed a considerable knowledge of medicinal plants. Among the most important ones discovered by them are quinine, balsam of Copaiba, and ipecacuanha. It is probable that the Indians, before it was known in the Old World, understood the application of aseptics, seeing that certain tribes dress their wounds with boiled water without having learnt this from the whites (15).

The Indians have discovered how to make use of a number of wild-growing American plants for twining cord, etc. Among these, Caraguata (Bromelia serra) may be noted. A certain proportion of the tools they used in working up the fibre are undoubtedly also Indian inventions.

From the bark of certain trees the Indians manufacture bast cloth, but as similar manufacture is also known from Oceania, it cannot definitely be asserted that in this case the Indians have made an entirely independent discovery. Similarity between the implements used both within and outside America in the preparation of bark cloth even speaks against such a supposition (16) (fig. 5).

From the above will be seen that the Indians in a wonderful way have known how to utilize the plant world by which they were surrounded, and in this province the peoples of the Old World have learnt a very great deal indeed from the Indians. In fact, during the period exceeding 400 years that Europeans have been in America they have not achieved one single important discovery in this department. Evidently the Indians have carried out tests and experiments with everything they found available.

Here I may add that the very idea of plant cultivation must, in America, be an Indian invention, for if it had been

introduced from abroad it must have been imported in association with some alien cultivable plant. For we have no reason whatever for supposing that the plants first cultivated by the Indians were the sweet potato and the bottle-gourd (Lagenaria) — plants which they have in common

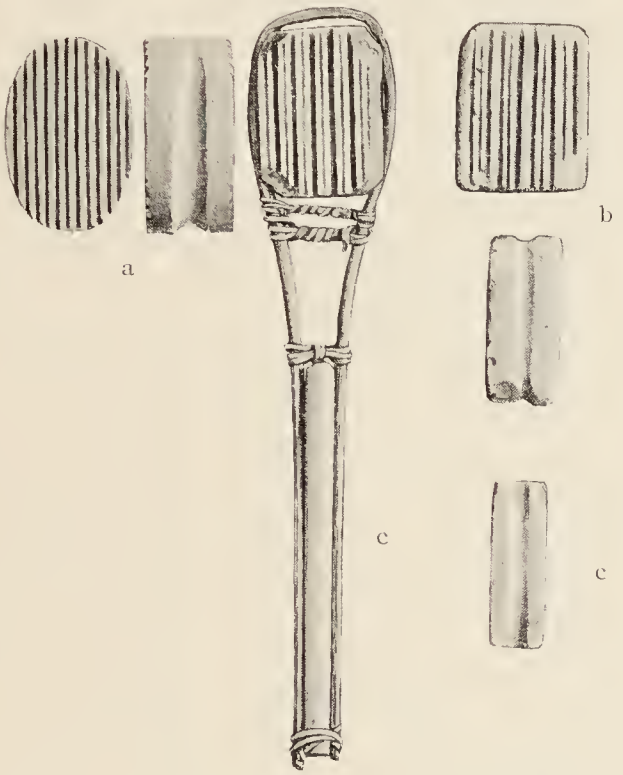


Fig. 5. Implements used in the preparation of bark cloth. ($\times^1/_3$) a — From Tobi, Yucatan G. M. 23.6.210. b — From Misantla, Mexico. G. M. 23.6.462. c — Toradja, Koelawi. Central Celebes. G. M. 26.9 758.

with Oceania (17) — cultivation having instead been inaugurated with some purely American utility plant. It is in fact evident that the sweet potato is in America a plant whose cultivation began at a later date than, e.g., maize. This is apparent from linguistic comparisons to which I shall recur. It is evident that those American Indians who now are cultivators must in some past era had ancestors who were not. The bringing of maize, manioc,

potatoes, etc., under cultivation must have required an immense space of time. What is remarkable is that not all the tribes that occupy regions where these plants successfully can be cultivated have turned cultivators, but that some of them have remained at the stage of hunters, fishermen or gleaners, such as, e.g., the majority of the Gês peoples, the Guayaqui, Siriono, etc., and that these peoples, when attempts have been made at civilizing them, have opposed the idea of their becoming cultivators.

If we now pass on to their domestic animals we shall find that not many are of purely American origin. For this we cannot blame the Indians, but the American fauna. They have domesticated the llama, alpaca, guinea-pig, musk-duck and the turkey. The dog's companionship with man is of such remote antiquity that it was possibly brought along when man first immigrated into the New World. It is, however, probable that the Indians have domesticated also one or more indigenous species of the Canis family (18, 19). A couple of American bee species have also been reclaimed for cultivation by the Indians (See Appendix 2). That this was a perfectly independent development is quite obvious. The cultivation of the Cochineal bug, for the production of red pigment, is also an Indian invention. The employment of the llama as a beast of burden must necessarily be an Indian invention, as also the pack-saddle pertaining to it.

Plants and domestic animals of the New and the Old World respectively with one or two exceptions differ from each other, hence we are able to ascertain that their discovery and utilization must have been independently made in the New World. This does not, however, apply in the case of metals as the same metals are found both in the New World and the Old. It is nevertheless probable that it was the Indians who first discovered at any rate one metal which is found in the Old World as well as the New, namely platinum (20). In regard to the working of metals

the Inca Indians have achieved an invention that we of the Old World only in recent times have succeeded in accomplishing — and then by a method quite different to that of the Indians — namely the art of welding copper. Thus we have in the Gothenburg Museum a copper rattle from Peru, in which the different parts are not soldered together but welded, as has been shown by one of Sweden's leading metallurgists, Mr. Hultgren (21).

If we turn to the subject of dwellings, clothing, ornaments, tools, weapons and so on, we shall find that the Indians do not possess much that is not also found in the Old World and which may off-hand be stated as having been invented by them. It also appears to me improbable that man would find it easier to subject a new plant to cultivation then inventing some new implement or process in order to benefit by it.

We shall see that the Indians have invented more than one thing that was not known to any of the innumerable peoples of widely variegated culture in the Old World, that is to say that they have made certain inventions that cannot be explained by the fact that they alone possessed the raw material. I have already referred to those objects which they manufacture from rubber.

In the realm of ceramics the application of sponge spicules in the clay (22), for cohesion and durability, is an invention made in Amazonas and, so far as I am aware, not known from any other part of the world. The spicules, which act as iron rods do in reinforced concrete, impart great strength to the clay vessels. Of ceramical forms many exist in the New World that are not met with in the Old. Thus for example vessels with a hollow rim, like those seen in fig. 6, probably represent a type that is of a purely American origin.

The hammock is an invention which we have received from the Indians. Its autochthonous occurrence in New Guinea may well be considered highly doubtful. It is more-

over unquestionably established that this comfortable form of bedstead was unknown outside America prior to the discovery of that continent. The hammock is an essentially Amazonian culture element.

The reduction of head-trophies in the Jivaro manner by removing the skull and shrinking the head to the size of a

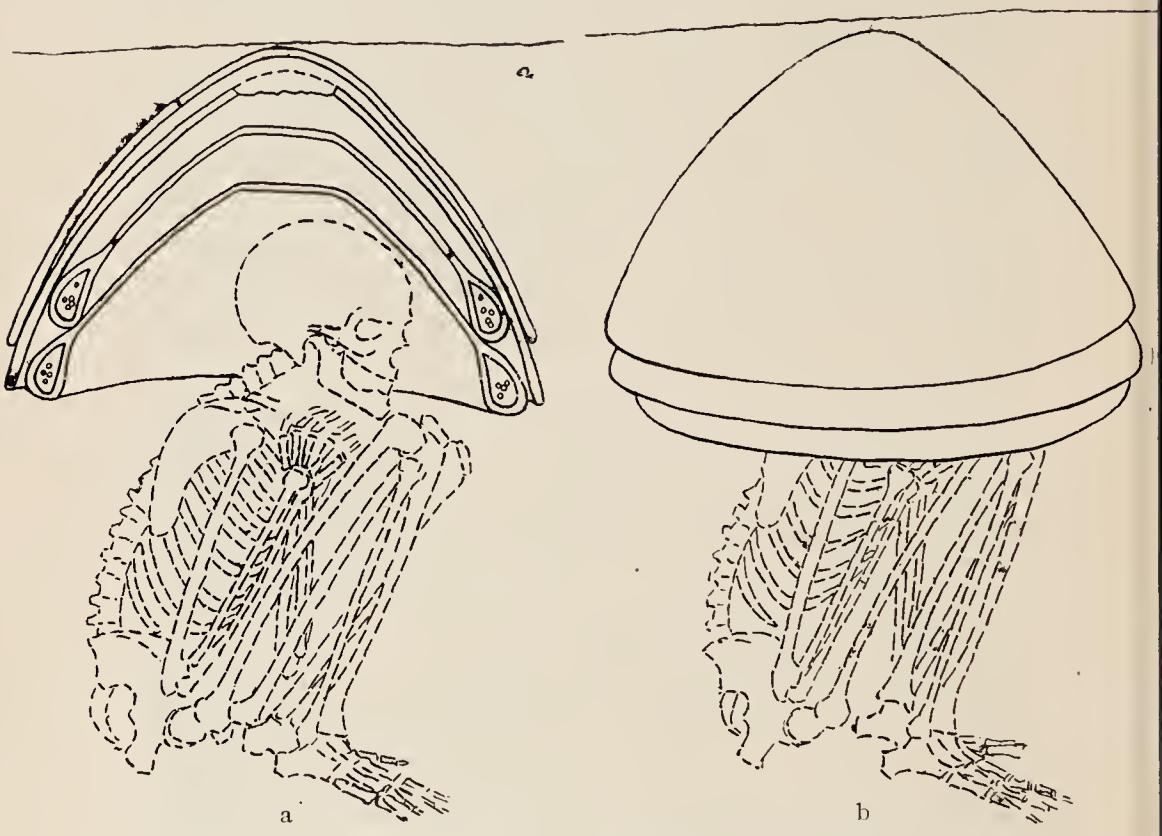


Fig. 6. Vessels with a hollow rim found at Tarupáyu, Bolivia. G. M.

fist whilst still retaining the shape of the facial features is a strange custom which is not known outside America.

Among musical instruments in America there are many that do not occur in the Old World, such as a quaint wind-instrument from Guiana (fig. 7), a strange-looking flute in the shape of an axe, described by Bolinder from the Motilones (fig. 8), and another extraordinary musical in-

strument made from tortoiseshell (fig. 9). Many forms of signalling gongs, too, are of purely Indian origin, as is also the Teponatzli, the wellknown "Zungentrommel" of the Mexicans. To this subject I shall recur later.

Of weapons there is none of especially Indian type, but on the other hand the Indians have made certain minor inventions as to weapons that are not found in the Old World, such as several methods of affixing feathers to arrows, for example Peruvian cemented feathering, sewed

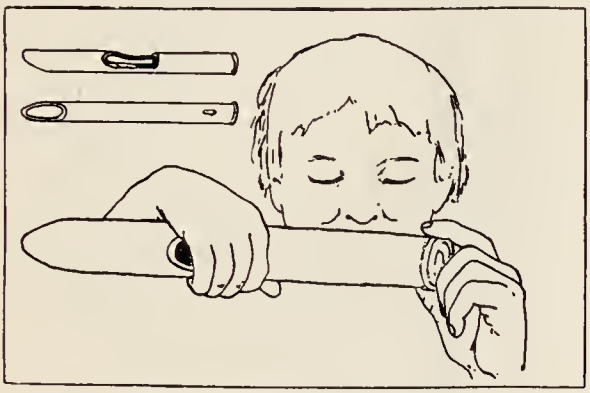


Fig. 7. Wannisemo-i flute from British-Guiana. (After Walter Both)

feathering, and others. Neither can it with certainty be maintained that any Indian method in hunting is entirely original. Nor can as regards fishing there be any method pointed to that only the Indians know. This latter is quite interesting to note in view of all we know of their important contribution as agriculturists to the progress of human culture.

In the way of dress and ornaments it is only as regards details that it can be shown that the Indians have hit upon anything unknown in the Old World. If, however, we study the ornaments more closely, we shall find that the Indians of America possess many original such details. In the first place this may be said of the feather ornaments. As is well known, in the manufacture of such ornaments the Indians are experts.

Fig. 8.
Axe-shaped flute from the Motilones, Colombia. ($\times 1/6$).
G. M. 16. 3. 244.

It would be almost unreasonable to expect that in Indian architectural art we might meet with anything unparalleled among the many-sided civilizations of the Old World. The dwelling-constructions of the Pueblo Indians are, however, in no small degree original.

The stoneless character of the country has in certain parts of America given rise to many minor inventions such as wooden knives, balls of clay instead of stones in "Stone-cooking", earthenware supports for roasting-dishes, "saddle-stones" of burnt clay, and so on. To this I shall again refer further on.

The employment of knotted strings ("quipus") for keeping records is widely distributed both within and out of America (See Appendix 3). Entirely original, and undoubtedly invented by the Indians, is however the arrangement of the knots according to the decimal system, which was known to the Incas (23). From the way the knots were arranged they were thus able, for example, distinctly to differentiate between numbers such as 31,301 and 3,001. We are not possessed of any proof whatever to show that quipus first were invented in Peru merely on the ground that there they attained a

fuller development than elsewhere. The circumstance of the enema syringe being most practically constructed in the upper Amazonas does not necessarily prove that the idea of giving enemas originated from there.

The numerical system of the Maya Indians is also original, as is also a great deal in their calendar and writings. Their chronological system actually embraces so much that is of an original character that by itself alone it suffices to demonstrate the high capacity of the Indians for making

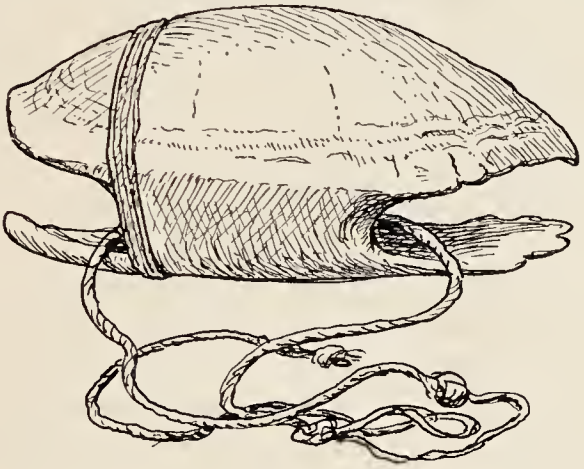


Fig. 9. Musical instrument made of a tortoiseshell. Ijca Indians, Colombia. ($\times 1/3$). G. M. 16. 3. 47.

inventions. In the Old World there exists no exact parallel to the wonderful chronological system of the Mayas.

I also think I should add that almost every Indian article possesses some detail, a something that perhaps is not always easy definitely to describe, but which to us reveals its Indian origin. It is due to all these trifling details that among an unlabelled ethnographical collection we are able to pick out the things that are Indian, and, as a rule, also determine from what particular tribe they originate. A good many of these apparently insignificant details are perhaps not infrequently more advanced inventions than may be supposed by anyone who does not him-

self use the weapon or implement in question, but only sees it as a museum official, or something similar.

It would be unfair to expect that Indians should have invented any ornaments that are not found in the Old World, although when it comes to the combining of ornaments nearly every tribe is able to present something that is characteristic of themselves.

A really thorough-going knowledge of the culture in certain parts of the Old World as of the New would probably result in showing that considerably more than what I have here adduced has been invented by the Indians and not known outside America prior to its discovery. Also in regard to social structure and the spiritual world, notions may no doubt be found that have a purely Indian origin. This is however not possible to prove conclusively unless one possesses a thorough knowledge of the geographical distribution all over the globe of the different conceptions on these subjects. A custom like, for instance, cremation in association with endo-cannibalism is probably purely Indian. This to give one example only. In great part the Incan state organization may well be supposed to be original.

If we study the distribution of those discoveries and inventions which the Indians must have independently made on account of their non-occurrence in the Old World, we shall find that a surprisingly great proportion of them fall within the Amazonas region.[1]) It is also evident that the Inca region was at least as important a culture centre as Central America and Mexico. As the present work principally deals with South America it is probable that I have overlooked some discoveries and inventions made by the Indians of North America.

It is mostly where the Indians have been prosperous

[1]) In this connection I wish to draw attention to Rivet's interesting theory that the Indians of the Amazonas region greatly influenced the Andean civilization.

that one meets with a large proportion of inventions and discoveries. I am afraid it is not always true that necessity is the mother of invention. If it were true, then inventions ought to have been made in places where the struggle for existence was very hard. But instead they are made where conditions of life are easy.

The most important of American discoveries and inventions unknown in the Old World at the time when America was discovered are given in the subjoined Table:

	Relating to					
	North America, N. of Mexico	Mexico, and Central America	Amazonas region	The Inca Realm	Cultivators	Gleaners
Maize	+	+	+	+	+	—
Manioc (sweet)	—	+	+	+	+	—
Manioc, the poisonous variety	—	—	+	—	+	—
Basketry bag for squeezing out the poison	—	—	+	—	+	—
Grater for pulping manioc	—	—	+	—	+	—
Meat-preservation with manioc juice	—	—	+	—	+	—
Potatoes	—	—	—	+	+	—
Chuño	—	—	—	+	+	—
Beans	+	+	+	+	+	—
Ground nuts	—	+	+	+	+	—
Jerusalem artichoke	+	—	—	—	+	—
Tobacco	+	+	+	+	+	+
Tobacco pipes	+	+	+	+	+	+
Pronged cigarholders	—	—	+	—	+	—
Coca	—	—	+	+	+	—
Agave	+	+	—	—	+	—
Cocoa	—	+	—	—	+	—
Cayenne pepper	+	+	+	+	+	—
Rubber balls	—	+	+	—	+	—
Enema syringe, of rubber	—	—	+	—	+	—
Intoxicant enemas	—	—	+	—	+	—
Elastic rings	—	—	+	—	+	—
Curare	—	—	+	—	+	—

	Relating to					
	North America, N. of Mexico	Mexico, and Central America	Amazonas region	The Inca Realm	Cultivators	Gleaners
Pakuru-neará	—	—	+	—	+	—
Parica	—	—	+	—	+	—
Snuff-inhaling tubes	—	—	+	—	+	—
Guaraná	—	—	+	—	+	—
Peyote	+	+	—	—	+	—
Paraguay tea (maté)	—	—	+	—	+	—
Balsam of Copaiba	—	—	—	+	+	—
Ipecacuanha	—	—	+	—	+	—
Aseptics	—	—	+	—	+	—
Quinine	—	—	+	+	+	—
Llamas	—	—	—	+	+	—
Alpacas	—	—	—	+	+	—
Guinea pigs	—	—	—	+	+	—
Musk-ducks	—	—	—	+	+	—
Turkeys	+	+	—	—	+	—
Domesticated bees	—	+	+	—	+	—
The cochineal bug	—	+	—	—	+	—
Platinum	—	—	—	+	+	—
Copper-welding	—	—	—	+	+	—
Reinforcing pottery clay with sponge spicules	—	—	+	—	+	—
The hammock	—	—	+	+	+	—
Reducing head trophies in the Jivaro manner	—	+	+	—	+	—
Earthenware supports for roasting plates	—	—	+	—	+	—
Clay vessels with a hollow rim	—	—	+	—	+	—
Teponatzli	—	+	—	—	+	—
Wannisemo- i flutes	—	—	+	—	+	—
Axe-shaped flutes	—	—	+	—	+	—
Certain musical instruments of tortoise shell	—	—	+	—	+	—
Saddle-stones, of burnt clay	—	+	+	—	+	—
Quipus with knots arranged by the decimal system	—	—	—	+	+	—
Maya Calendar	—	+	—	—	+	—

Thus we see that a good many things have been discovered and invented by the Indians, and I repeat what I have already once before said: are we not justified in supposing that the race that has achieved all the discoveries enumerated above, together with the inventions therewith connected that were not known in the Old World in pre-Columbian times, also might have been capable of inventing something or other which was also known there? To me it appears illogical to hold a contrary opinion.

In saying this I by no means wish to deny that the Indians have received much of their culture from the Old World, but in every case when we meet with a similar invention in the Old World and in the New we ought as thoroughly as possible to investigate the probablity whether it is a question of a loan or an independent invention. As I have already said, ethnologists are often too much inclined to believe one thing or the other without comprehensively examining the reasons that may be for or against.

I have now adduced what the Indians must have discovered and invented because these discoveries and inventions were not known outside America, and in this I have pointed out that is it illogical to suppose that, when the Indians have achieved many inventions of things that in pre-Columbian times were unknown in the Old World with its various cultures, they may not also have invented something or other that also was known there.

In the following I propose to show that such independent Indian inventions were possible and even probable.

CHAPTER II.

How different tribes have adapted themselves to their surroundings, and inventions connected therewith.

Whether a people has immigrated into South America via Darien or Oceania, and then spread over the South American continent, it must necessarily have adapted itself to the physical conditions that prevail in the different regions, conditions which in respect of climate, fauna and flora must have presented much novelty. A detailed study of the South American Indians will reveal how excellently this adaptation as a rule has been effected.

It is however difficult to understand the exact extent to which a people has suitably accommodated itself to its natural surroundings, unless one has lived among them for some considerable time. A people may be considered as having attained a high degree of adaptation if it never needs to starve or suffer from extreme cold or heat, when it is protected from human enemies, wild animals and insects, as well as from disasters connected with periodically recurring inundations, etc.

From these points of view I now propose to discuss certain of the tribes whom I have learnt to know, and will then begin with the Chocó, in the Isthmus of Panama.

These Indians hardly ever need to starve, as their crops rarely fail. In parts, however, they cultivate less than they actually require and might easily find the time for. They are not lacking such implements and utensils as they need for gathering and preparing their food.

The Chocó huts, which consist of pile-dwellings, are excellently adapted to protect the occupants against excessive heat, floods, rain and wild animals. In them mosquitoes are at times troublesome, though not in such a degree as might be expected. Latterly mosquito-nets have come into general use, since the Chocó are able to buy woven fabrics from the whites. It is possible that formerly they had such curtains made of bark-cloth. In other respects their beds are very primitive, and one wonders why the Indians do not provide themselves with more blankets of bark-cloth.

The Chocó wear very little clothing, having probably found this plan best suited to the climate. Less cold is felt by allowing the rain to fall on the naked body than by going about in soaked clothing.

For navigating the rivers these Indians have canoes that are very well suited for that purpose although not much good for the open sea, which to the Chocó appears to be, comparatively speaking, a novelty.

From their white or black neighbours these Indians have nothing to learn that would help them in their struggle for existence beyond what they already have learnt from them, i. e. in the first place the cultivation of bananas and keeping domesticated pigs, and further cultivating the bread-fruit tree and keeping fowls.

The fact of the Chocó being able to occupy a very large tract of country in single, scattered families is naturally an important advantage. If they lived concentrated into villages, their cultivations would in parts lie far away from the village, or there would not be enough of cultivable ground for everybody.

I cannot think of anything that the Choco might learn from their neighbours, the Cuna, to assist them in their struggle for existence. It is however strange that they have not learnt from them, or from their other neighbours, the Cayapá, the art of spinning and weaving. This must be connected with their formerly possessing immense

quantities of barkcloth, and in consequence having no use for textiles.

Like the Chocó, the Cunas possess important cultivations and well-built huts. Those of them who are living on the islands of the San Blas archipelago are free from mosquitoes, but apparently these Indians more often than the Chocó suffer from food-shortage on account of their living in villages, with occasional attendance of inadequacy as regards arable land sufficiently near. Their having settled on the islands constitutes an instance of late adaptation. They possess canoes that are excellently suited both for the ocean and the rivers.

Passing now on to some of the tribes whom I know well in Bolivia and Peru, there are, for example, the Chimane who derive abundant food from their cultivations. Their huts, on the other hand, are poorly constructed. They wear clothes made from strong, home-woven cotton cloth. In spite of the fact that they live in a country terribly mosquito-ridden, they possess no mosquito-nets other than in cases where they have managed to acquire them from the whites. That they are plagued by the mosquitoes is evident from the fact that occasionally they dig themselves down into the sand for protection against them.

The Chiriguano and the Chané, both being agriculturists in a large way, will probably only rarely feel the pinch of scarcity. As they seldom find any opportunity for fishing, and their hunting facilities being very poor, it follows that they are almost wholly vegetarians. Their huts are quite good enough. Formerly they had large huts housing many families together, but these have long fallen into disuse, and nowadays each family has a hut of its own. This change has probably taken place in consequence of their no longer being obliged to carry on warfare, and thus it not being necessary for the men to keep together in one hut, an arrangement that once was advantageous for the purpose of defence. Their stored crop of maize, which to them is of the utmost

importance, they keep in granaries built on poles. They possess no water-craft apart from here and there a balsa. Besides, they could hardly find much use for canoes. Nowadays the Chiriguano and the Chané obtain a good deal of cloth from the whites, but even before that they cultivated cotton and no doubt were sufficiently provided with home-woven clothes so as not to need feeling cold.

If from the same points of view we study a tribe like the Choroti of the Chaco, we shall find that they are subject to periods of food-scarcity. I have myself been with them during famine times and have heard terrible accounts from such as have experienced them in the past. This state of things may principally be due to these Indians not being agriculturists to any considerable extent — in its turn probably ascribable to the fact that agriculture is a comparatively recent departure on their part — but also resulting from lack of forethought as well as from their country being arid and thus less suitable for agriculture. It is strange to note that these periodically recurring famine times have not induced these Indians to expend increased labour on their cultivations. Their neighbours, the Aslushlay, are no doubt better off in this respect as they possess cultivations on a large scale.

The huts of the Choroti are wretched as protection against rain, but not so bad in the cold weather. These small and low huts provide better shelter against the cold southerly gales than the type of hut would, used by the Chiriguano and the Chané, a type that they quite well could have imitated if they had cared to, as they are not unaquainted with its existence. The Choroti possess warm mantles woven of wool, although not in quantities sufficient to protect them altogether from the cold when the bleak winds from the south sweep over the Chaco.

Thus we see that, according to my experience, such Indians as are agriculturists have well accommodated themselves to the conditions under which they are living. There is

not so much they need learn besides, in order to ameliorate their struggle for existence. In a worse position are those who mainly live by gathering wild-growing fruits, and by fishing, but nevertheless I have, as already mentioned, sojourned in regions where existence is relatively easy even without the possession of cultivations.

It will be apparent that, generally speaking, the different tribes have accommodated themselves very well to the conditions under which they live. This has not been possible for them to achieve without their having made many discoveries and inventions, or by learning from other tribes that have already adapted themselves to the prevalent nature conditions.

The process of adaption includes not only what is most essential in the mere struggle for existence, but also innumerable details. This is apparent both in comparing the cultures of the tribes between themselves and in comparing the cultures within the same tribe when the latter is spread over a region of varying physical conditions. Of this I can give several examples. If, for instance, we study the different types of huts of the Quichua, all the way from the Chapáre valley to Cuzco, we shall find them everywhere admirably adapted to climatic conditions. In the Chaparé valley, where it is very often raining, the huts have exceedingly high-pitched roofs and floors raised on poles, whilst in the Cochabamba valley, where timber is absent or very costly, the huts are constructed of mud. On the high plateau north of Lake Titicaca, where icy winds are prevalent, the houses are partly sunk into the ground, and so on.

Is it then to be supposed that the Quichua Indians of the Chaparé valley have borrowed from elsewhere the idea of building houses on poles, or the Quichua Indians living north of Lake Titicaca, the method of partly sinking their huts into the ground, and so on? Is it not possible that this very acommodation, so excellently suitable to prevalent conditions, points to instances of independent inventions? These

may not necessarily have been achieved by the Quichua, but at all events within the area where they are found so eminently useful. This all the more as it is difficult to suppose that these inventions could have been borrowed from any other locality where they would have been useless.

If, for example, we study arrows for shooting fish with in the country inhabited by the Chiriguano, we find that the arrows used on Rio Pilcomayo are different to those used on Rio Parapiti. On the Pilcomayo an arrow of ordinary type is used, whilst on Rio Parapiti, with its scanty waters, there is used a highly specialized type designed for shooting quite small fishes — a type which does not occur anywhere else in South America and therefore must be taken to be an independent invention especially made for Rio Parapiti (fig. 10).

Fig. 10. Point of arrow for fishing. Chiriguano, Rio Parapiti. a. R. M. E. 618 1/4.

The landing-nets used on Rio Pilcomayo and Rio Parapiti, respectively, are, although on the whole of the same form, differently adapted to the fish of these rivers. Water-pitchers vary within the Chiriguano area from quite narrow-necked vessels in localities where water is scarce, to more open-mouthed where the water supply is ample, and so on.

As to the efficacy of Indian fishing methods we can know but very little. For this it is necessary to have personally used the various fishing gear, and to be conversant with the habits of the fish that are to be caught by the implements in question.

Many other examples might be adduced.

As long as a people remains settled in the same surroundings where it has thoroughly adapted itself to its environs, it may be taken as probable that in certain departments the old-established and habitual is conservatively adhered to.

A certain measure of stagnation is bound to set in. But it will be otherwise if such a people migrates into another region where conditions are different.

Thus it is obvious that if, for example, a people has come from Polynesia and settled in the primeval forests of Darien, it must have adapted itself by methods quite different from those employed by another people which has come from the same place but settled in the arid Peruvian coastland. In Darien it will have proved — if it be that such migrations have actually taken place — easier to retain the old mode of living, i. e. to live like in the old home in the islands. The same applies to the inland migrations of the Indians. In the new country it is necessary to find substitutes for things one formerly was used to.

We should bear in mind that all migratory movements are productive of inventions or loans of new cultural elements and modifications of old ones. In the history of the earliest inventions we may therefore be certain that substitutes have played an important part, and these are worth a thorough study. A people may, for example, have emigrated from a district in which was found an excellent material for carrying-baskets, and entered another where such material was absent. Thus they have had to find some substitute which probably led to the invention of new basket types that were better suited to the new conditions. Where the new district was inhabited by people who possessed carrying-baskets or satchels made from some indigenous material, then it is probable that the existing forms made from that material were simply copied. But in case nothing similar was met with, the immigrants were obliged either to invent something new or else to leave off carrying the way they were used to. This sort of adaptation to natural conditions of the locality of abode must have played an exceedingly important part in the history of inventions.

I shall here confine myself to mentioning one particular kind of substitute that in America has been fruitful of a

number of inventions, namely substitutes for stone. America contains many large regions more or less devoid of stone. Among such regions I have myself visited El Gran Chaco and Mojos in South America, and the Sacramento River delta area in California.

The Chaco is in certain parts so bare of stones that one may live in them for many months without finding a stone as big as one's hand. In my books I have pointed out that these conditions have caused the inhabitants to cast about for various substitutes for stone (24). There the Indians manufacture knives of hard wood or bone, similar in form to those made of stone found in archaeological excavations in districts richer in stone, nearer the Andes. In the same way they also have saws, or scrapers, shaped like those of stone that have been in use farther west. In the Chaco I have seen the Indians use their spades, which are of lignum-vitae, as whetstones. In those parts they also use bola "stones" made of hard wood.

In Mojos in Bolivia there are also districts that are very destitute of stones. When d'Orbigny started from Mojos for the mountain regions with Indians of the plains (25), as they went along they picked up every stone they saw — such was the high value of stones to them — but soon they found this impossible. Stones were precious things in their country. This circumstance has, among other things, resulted in "saddlestones" having been supplanted by grinding implements — not mortars, — made from wood or burnt clay. Of these, both the lower slab as well as "mullers" are abundantly present in the ancient dwelling sites at Mojos.

Large districts of Amazonas are — like Mojos — very dificient in stones. In consequence, trading in stone celts came into being. Nowadays there is not a single Indian tribe that possesses arrow-heads of stone. The arrow-points are nearly always made of hard wood or bamboo. It is however evident that formerly stone points were fairly commonly used, as is proved by local archaeological disco-

veries (26). It is very probable that when the Indians first took possession of Amazonas they had stone-pointed arrows, but that they subsequently had to find some substitute for their stone arrow-heads owing to the difficulty of obtaining the raw material. In Mojos, again, the ancients had sling-stones of burnt clay, whilst bits of broken pottery probably served as whetstones for arrow-heads of bone. (27).

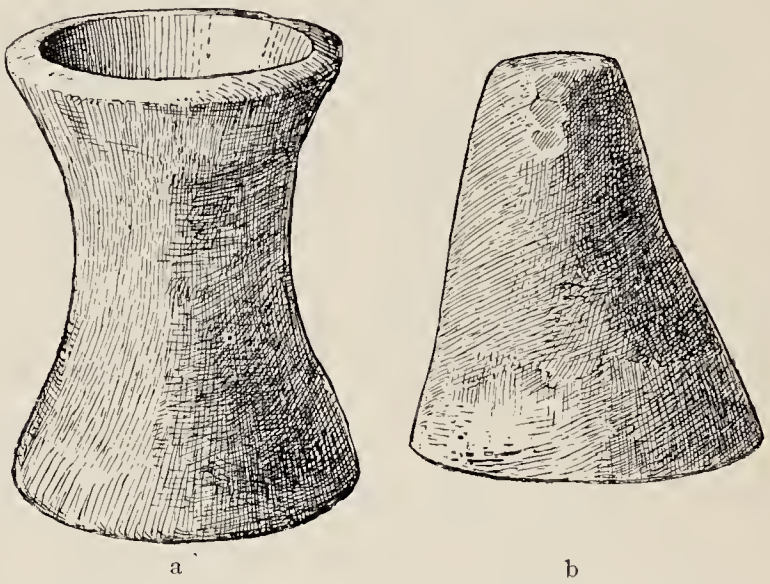
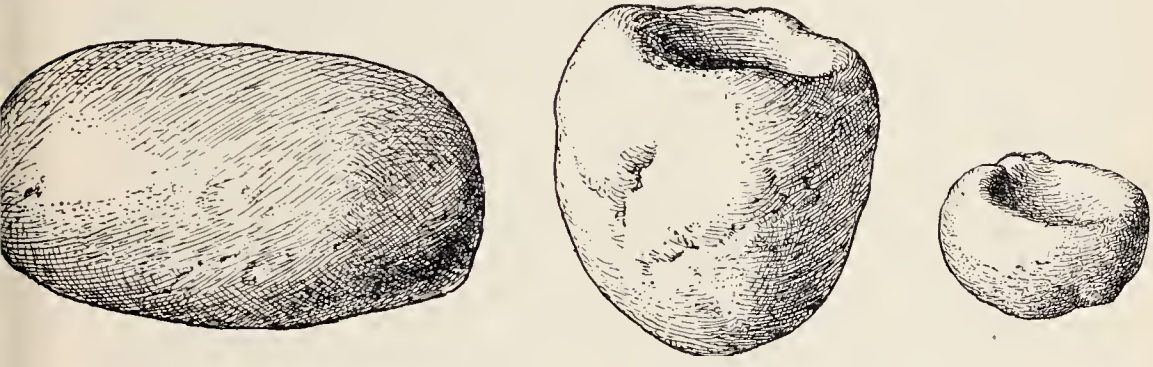


Fig. 11. Hearthstones of baked clay a. from the Baniva, North-west. Brazil. G. M. 28. 1. 95 b. b. from the Cavina, Bolivia. G. M. 15. 1. 1437. ($\times$ 2/3.)

An interesting point is the use of hearth-stones made from burnt clay. These are even found in localities where stones occur, as will be seen from a map which I have published (28). This is an instance of substitutional invention having spread into regions where the substitute was not needed. The form has also been modified and made barrel-shaped instead of pyramidal, its supposedly original shape (fig. 11). Among substitutes for stones I also think we should count the mussel axes of the West Indies. But this provides no reason for supposing any connection between the mussel axes of Oceania and those of the West Indies.

Of very especial interest appear to be the substitutes for stones that are found in the delta region of the Sacramento River in California. There, together with some Berkeley students, I have at a spot near Lodi examined a mound which had been discovered by Mr. J. Dawson in a very stoneless tract.

In the old days the majority of the Indians of California possessed no clay vessels for preparing their food; the cooking was done by heating stones in the camp fire, and when red-hot they were dropped into a watertight basket which was made to serve as a cooking pot. This basket with



a b c

Fig. 12. a. Ball of baked clay, used for "stone-boiling". G. M. 27. 6. 3. b and c. cups of burnt clay. G. M. 27. 6. 287, 27. 6. 246. From a mound near Lodi, California, ($\times 7/5$.)

water or soup could not be placed directly on the fire as then of course it would have been burnt to pieces. The stones used in the "stone-boiling" process were as big as a man's fist or perhaps slightly smaller.

The Indians that once inhabited the dwelling-site near Lodi possessed no clay vessels for cooking their food in, but neither did they have any stones for "stone-boiling". No stones of that kind have been discovered in the mound. But this method of cooking was, however, nevertheless known to them, only that instead of stones they used balls of baked clay (fig. 12 a). Of such there are hundreds to be found in the excavating of the mound. Fragments of them

occur in thousands. The ancient Lodi inhabitants will thus be seen to have been potteryless but yet to have used baked clay very largely.

These objects did not, however, constitute our most important finds in the Lodi mound, but instead certain fumbling attempts at forming the balls just referred to into small bowls of burnt clay. These are however only quite small, and cannot be supposed to have served for anything beyond cups for holding paint, or such like, but nevertheless represent the germ of pottery-making. It is to Mr. Dawson, an amateur archaeologist of Lodi, that the discovery of this mound may properly be ascribed, and he has here recovered two very small bowls, one of which has a hole pierced through the rim so that it could be suspended.

In the manufacture of many of these clay balls a basket-woven mat has evidently been used. While the clay was soft, impressions were left in it from the mat, and then so well preserved by the firing that it is quite easy to study what different of kinds of basketry technique were known to the Indians that inhabited the Mound. In some of the balls were also incised ornaments resembling those seen in primitive stone-age ceramics from so many parts of the world. The system of ornamental designs characteristic of such ceramics existed before clay vessels came into being. Ornaments of this type are, in fact, incised on the fragmentary bowls recovered by Mr. Dawson. Here not only was made the invention of ceramics but even of ornamented ceramics.

Are not these finds capable of furnishing us with an explanation as to how ceramics have been invented, at all events in one spot? The theory has been advanced that man to begin with possessed baskets coated with clay, and then that someone may by mistake have put one of those baskets into the fire, with the result that the fire consumed the basketwork but produced a vessel of burnt clay. This theory

is simply preposterous. There could have been no other result than a rubble of burnt clay. Much more natural it seems to me that man at first used baked clay for less fragile things than pottery, and that he made the first attempts at pottery-making only after having learnt how to wash the clay, or in some other way to prepare it. It must have begun in the same simple way as was done by the ancient Indians of Lodi, namely by way of tiny bowls. Subsequently, when larger sizes seemed desirable, the various building-up methods were invented, methods that we know from different parts of the world. It is not, however, unreasonable to suppose that the technique used in basketry led up to the idea of building the vessels with rolls of clay laid in spiral courses. But clay vessels were not originally baskets smeared with clay.

It is not by any means my intention to maintain that the art of pottery-making was originally invented at Lodi, and that from there it was disseminated over the remainder of America. I do not think that the Lodi mound is so very old. I only wish to say that the ancient Indians of Lodi did invent pottery-making, and that therefore not all Indian ceramics have a common origin. It is quite possible that this invention of the Lodi Indians never became of much use to them, but it should be remembered that very likely they were not permanently settled and therefore had no urgent need for clay vessels. The invention was a premature one. It is not impossible, however, that the Lodi Indians' invention is still surviving in the ceramics of the Yokut Indians, about which Kroeber (29) inter alia writes:

> "'The distinctive feature of this pottery is its excessive crudeness. It appears to have been made by a rough fitting together of pieces of clay, or a pressing out of a lump: There is no evidence of the coiling and smoothing method. It is doubtful whether the clay contains tempering. Glue, blood, or a sticky sub-

stance may have been introduced as binding material. The color is from light to dark gray. There is no slip, wash, or pattern, except now and then a rude incision obviously modeled on a basket pattern. The shapes are indefinitely varied, without approach to standardized forms. A row of their vessels looks as if produced by children or experimenters.

Even the uses are not known. Most of the pots show evidences of employment in the fire. But their purposes must have been special, since the ordinary cooking of the Yokuts is as regularly performed in baskets as among other groups. Small vessels may have been intended for services that we can only suspect. Thus the Yaudanchi affirm that they formerly kept tobacco in hollowed clay balls.

Archaeology gives no information as to the age of the industry. There has been little collecting in the Yokuts area and no systematic exploration. The prehistoric clay cooking balls or sling shots of the stoneless Stockton plains, where the Yokuts Chulamni lived in the historic period, suggest a connection; but no vessels of the same material have ever been found with these. The Clear Lake Pomo sometimes make a minute receptacle by pressing a hole in a lump of clay; but they do not bake these little articles. Evidently there were some anticipations toward pottery-making latent in parts of California; and the Yokuts carried these tentative steps a little further. But the inference of a stimulus, however indirect, coming through their immediate Shoshonean neighbors from the pottery-making Shoshoneans of the south or east can hardly be avoided; and therewith the interpretation of an ultimate southwestern origin of the art."

Thus far Kroeber. That the Lodi Indians' crude attempts at making small bowls would have been due to inspiration received from the east I consider out of the ques-

tion because if that had been the case they would have manufactured real clay vessels, and then we should not have been able so clearly to perceive the connection between the latter and the clay balls.

Many another change in the material is bound to take place when a people migrates long distances. And change of material may often influence the shape of an implement.

Migration from one region into another therefore should easily bring about, for example, a change in the shape of a bow, because the kind of wood from which the bows used to be made is not found in the new country whose indigenous woods are not suitable for manufacturing bows of the old shape. If nothing but certain palm wood is available, it comes most natural to give the bows a flattened shape, as that is the form which results from cutting them out of the hard edge wood. Thus it is incorrect to speak of the section of a bow as something that had to be unchangingly adhered to through thousands of years, without taking into consideration the kind of wood that formed the material.

In the same way the shapes of blowguns are of course very much dependent on a supply of suitable material. The Cunas of Darien have reeds that are too short for blowguns. They therefore join three lengths of reed together much in the same way as is sometimes done with our fishing rods (fig. 13). If, for example, a district is devoid of the material that elsewhere was habitually employed, then people either have to find some substitute material or else discard the use of blowguns. There are certain ethnographers who appear to find this fact hard to understand.

Fig. 13. Blowgun from the Cuna Indians of Darien ($\times$ 1/8). G. M. 27. 27. 1180.

I have now given some account of such inventions and discoveries as must have been made in America for the reason that they were unknown in the rest of the world prior to the discovery of America, as well as of such as obviously constitute adaptations to extreme physiographical conditions. My next aim will be to discuss some further inventions which, although possessed in common by the Old World and the New at the time of the Discovery, appear to have been independently made in America.

CHAPTER III.

On certain inventions probably independently made both in the Old World and the New.

If the Indians of South America had possessed bronze in which the tin and the copper were mixed in the same proportion as in the Old World, and if it could be proved that their Bronze Age followed immediately upon their Stone Age, then it would be quite clear that bronze was an importation from the Old World. Now we know that such was not the case, but that the bronze age was preceded by a copper age, and that the Indians of Bolivia only in a later stage of the bronze age succeeded in discovering an effective proportion between tin and copper (30). This discovery, which appears to have been made not far from Lake Titicaca, subsequently spread to the Peruvian coast and Mexico (31). It is therefore evident that bronze is an invention independently made in America. In the same way we ought in every case to examine whether in any given district an invention occurs in its completed stage or whether we there find preliminary stages of it, in which latter case it is very probable that it is indigenous, or that at any rate the improvements have been achieved in America.

To choose a few examples. In a special paper (32) I have made a study of the distribution of palisades in South America, and then found that there occur both very complex types with loopholes, pitfalls, and so on, and with double rows of poles, and also palisades consisting of nothing beyond fences of thorny trees, more or less elaborately

Fig. 14, a—f. After Ambrosetti (El Bronze, fig. 54 and fig 56.) a. Copper axe with raw-hide binding, reproduetion of an axe depieted by Lehmann-Nitsche from Rio San Juan del Mayo, Puna de Jujuy. b. Catamarca. c. La Paya. d. Cañada de Belén. e. Pampa grande. The haft is modern. f. Santa Maria.

constructed. It is quite obvious that the earliest palisades in South America simply consisted of fences, and that subsequently these protections round the huts developed into palisades of more or less complicated nature. This circumstance speaks in favour of palisades having been independently invented in America.

The handle-holed axe-head, that is axes in which the handle is inserted into the head, in America occurs only within the culture region in Peru. After Ambrosetti I have, in Part 4 of my series "Comparative Ethnographical Studies",

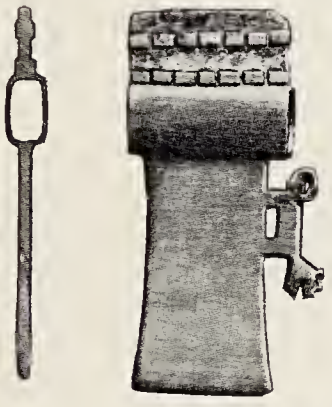


Fig. 14 g. Copper axe from Trujillo on the Peruvian coast. (After Baessler). ($\times 1/4$).

clearly shown that in that region the Indians to begin with possessed T-shaped axes of copper which they fastened to a handle with a piece of rawhide taken round the handle and sewn together at the back (fig. 14 a). On other axes this binding was at a later stage imitated in metal, and a handle-holed axe resulted (fig. 14 g). Even the stitches by which the rawhide used to be secured were reproduced in the metal, so that they remained as an ornament. As a matter of fact it can here be clearly seen how the process developed by which the handle-holed axe was invented in America where otherwise it was unknown, and the handle-holed axe represents a very important invention whose

distribution in the Old World is, and even formerly was, very extensive. That it did not become so widely spread in America is probably ascribable to the circumstance that it was invented at a relatively late period, that is to say not very long before the Discovery.

Metal tweezers are — as was first pointed out by Uhle — an imitation of the tweezers of mussel shell resembling those which at the time of the Discovery were still being used by the Araucanians. In Peru the earlier tweezers, which are of mussel shape, are as a rule made of copper, whilst tweezers of a shape more divergent from that of the original mussel-shell tweezers are made of bronze (33). This lends support to Uhle's theory. It proves that metal tweezers are Indian inventions. Whether tweezers, generally speaking, were independently invented by the Indians is another question (See Appendix).

Another instance is supplied by the so-called signalling "drum". This instrument occurs in America in quite a number of forms (See Appendix). To begin with there are the very simplest ones, mentioned by K.v.d. Steinen from the Bakaïrí (34) and the Kamayurá. He writes: "Im dritten Bakaïrídorf und bei den Kamayurá wurde als Pauke ein hohler Baum der auf der Erde lag benutz". And of another tribe, the Auetö, of the same region Max Schmidt (35) writes: "In der Mitte des Innenraumes befand sich am Boden ein dicker etwa 6 m. langer, ausgehöhlter Baumstamm, den mit einen grossen Holzklotz einer Trommel gleich geschlagen wird, um bei wichtigen Angelegenheiten die männliche Auetöbevölkerung schnell zusammenrufen". According to Lange (36), the Arandeuara use for a gong a hollow log suspended from a tree.

In the instances I have just cited it appears that the gongs in question merely consisted of hollow or roughly scooped-out tree stems. These are evidently forms much more primitive than the well made gongs that I shall refer to below. A still more simple method of signalling is by beating on the trunk of a tree in the forest. Thus Farabee

(37) writes of the Amahuaca Indians of Peru that they occasionally signalled by striking with a heavy mallet upon a flat root of the Alatea tree, after having stripped the bark from it but without cutting it off.

Fig. 15. Wooden gong resembling a clumsily made canoe. From the Nonama Indians in Colombia. (Author, phot.). G. M. 27. 27. 465.

Very crude gongs are also found among the Nonamá Indians, a tribe belonging to the Chocó group. During my latest journey in South America (1927) I visited those Indians on Rio Docordó in Columbia. The Nonamá (also

called Noanamá) are settled along Rio San Juan and its affluents. Among other things that I noted among them was a large wooden gong (fig. 15). It looks rather like a clumsily made canoe that has been suspended by one end whilst the other rests on the floor of the pile-built house. It is beaten with two wooden mallets. One of these is used on the outside, and the other on the inside, of the gong which is placed in the centre of the hut.

The resemblance between a gong of this kind and a canoe is so great that it is quite reasonable to suppose that the Indians formerly used as gongs their canoes, which are often drawn up underneath the floor of their pile-houses or laid on stagings.

We next come to a kind of gongs that usually are described as signalling drums. They are characterized by having been carefully hollowed out from a tree stem, in such a way as to leave the aperture — or apertures — quite small and narrow. The best known are those which have been described by Gumilla (38) and Koch-Grünberg (39), from Rio Orinoco (fig. 16 b) and Rio Negro (fig. 16 a). Beside the two authors just referred to, many others have mentioned this type of gong, even as far back as the time of the Discovery, as for instance Carvajal (40) and Heriarte (41), so that therefore there can be no doubt whatever that it existed in America already at that time.

As already pointed out by d'Harcourt (42), in America these gongs are not of uniform shape, but present wide variety as regards the apertures.

Lastly I suppose that with the above type of gongs we also ought to class the Mexican and Central American "Zungentrommeln" called Teponatzli, a type that also occurred in Haiti at the time of the Discovery (43). With the majority of these better-class gongs, whether "Schlitz- or Zungentrommeln", drumsticks are used whose heads are covered with rubber.

From the above will be evident that in America we

find very great variety as to form in the "Schlitz- and Zungentrommeln", so that we meet with a multitude of shapes, ranging from the very primitive to the most perfected.

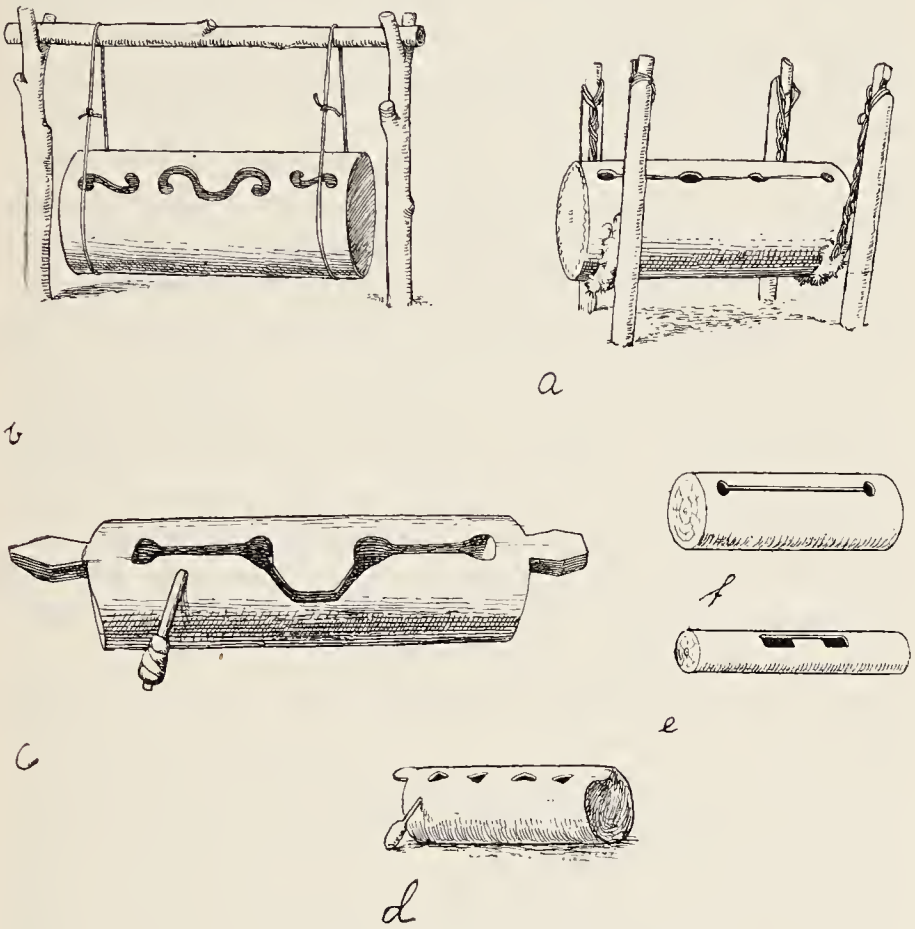


Fig. 16. Signal gongs.
a. Tucano. After Koch-Grünberg. b. Caverre. After Gumilla. c. Jivaro. G. M. 20.7.276. (Karsten's Collection). d. Jivaro. After Rivet. e. Jivaro. After Farabee. f. Uitoto. After Farabee.

If it might be supposed that the Indians learnt from Melanesia the use of signalling drums, that specialized form of it which is known as "teponatzli" must in any case be American as it does not occur in Melanesia or other parts of the world. Neither am I aware that such curious concav-

ities as, for example, those found on the signalling gongs from Orinoco are known from Melanesia (fig. 16 b).

As will have been apparent from the above survey, the Chocó Indians signal by beating on a very crude gong resembling a suspended canoe, whilst the Auetö Indians strike a suspended hollow tree stem. The supposedly "imported" Melanesian signalling gong may thus be taken to have inspired both improvements and simplifications, or may we, on the other hand, suppose that the Indians themselves have hit upon the idea of signalling by way of beating upon a hollow and suspended tree stem or canoe, and that they have independently invented the teponatzli — but at the same time that they from Melanesia have learnt a type of signalling gong which now no longer exists but has been supplanted by other types. If we study the variation as to form we shall no doubt incline to the opinion that gongs of this type represent an invention independently made in America. We must bear in mind that the mere circumstance of signalling drums occurring both in Melanesia and America does not constitute conclusive proof of a common origin.

The idea of beating on signalling gongs as well as on the teponatzli — with rubber-covered mallets — must be of Indian origin because nothing similar is known outside of America. That the teponatzli is intimately connected with other gongs of a similar type is obvious, although it was not used for signalling. I think it most natural to suppose the invention of these gongs to have come about by people to begin with having sent out signals by beating on hollow trees in the forest, subsequently carrying them home to the village, or that signalling was done by drumming on canoes or wooden troughs. Then by degrees these make-shift gongs have been improved upon in various ways.

The liana bridge is also counted among the culture elements that has been considered as having a Melanesian (44) origin. Nevertheless, many more important

bridge constructions of this kind are known from America than from Melanesia, as is, for example, evident from Cobo's excellent description of the bridges of the Incan kingdom (See Appendix.) There had also been invented a type of bridge, "uruya", which is unknown in Melanesia. In America, too, Botocudos and Sirionos have exceedingly simple bridges consisting of one or two lianas stretched across the river.

Those who believe that the liana bridge is a culture element imported from Melanesia into America, is it their opinion that the primitive Siriono and Botocudo Indians have independently produced these inventions, or that their bridges are a simplified form of other tribes' more elaborate bridge constructions? According to them, it would appear that it is neither the poorest nor the superior suspension bridges that the Indians have learnt from Melanesia to construct, but only such as are somewhere in between. It is moreover to be noted that the Indians possess several other types of bridges, viz. floating bridges (Aymara), foot-bridges of poles laid across (Huari), and cantilever constructions (Quichua) (See Appendix.) It is quite evident that the art of bridge-building was independently invented in America.

To the "Oceanian" culture elements also belong maces with heads in the form of stone rings, either smooth or more or less provided with projections. Correspondence between certain Melanesian maces and others recovered in Peru is indeed striking, and appearing to furnish proof of a common origin.

It should however be noted that the stone-ring mace was preceded by the digging stick of the type used by the Bushmen, and, that these implements at the time of the Discovery existed both in California and southern Chile (45.) The digging stick would thus have been a very ancient culture element in America — if it has not been independently invented both in the extreme south of South

Fig. 17. Mace with head in the form of a stone ring; found at Ica, coast af Peru ($\times$ 1/8.) G.M. 21.2.21.

America and in California. Strictly speaking, a mace with a smooth stone head is nothing but a digging-stick used for whacking people over the head with. Thus we must either believe that in remote antiquity the Indians received the digging-stick with stone ring from Oceania, or that from that quarter they have only learnt how to give more of a star-shape to their mace-heads, or else that in this department they have not learnt anything from anywhere. The idea of making mace-heads of metal, such as the Indians of Peru possessed at the time of the Discovery, must of course be their own. In this they have partly imitated the stone forms, but in addition invented one or two things originally of their own. It may be questioned whether a simple club, like the one depicted in fig. 17, with the lower end of the handle pointed, has not been used both as digging stick and a weapon. It was recovered at Ica, on the coast of Peru.

To those inventions that in America we are able to trace from their most simple forms up to their most complex also belong quipus, which I have already mentioned. In large parts of South, Central and North America the Indians possess simple quipus (fig. 18) of which the common feature is that they consist of a single cord with knots, mostly used for keeping record of days (See Appendix 3). More complicated quipus only occur ed in Peru. (46)

In this connection I wish to say a few words about Indian ceramics in general. In ceramics, among the most important inventions are moulding of clay vessels, or parts of clay vessels, in a form, painting prior to firing, affixing of handles, feet, and so on. These inventions were unknown

in early ceramics that have been discovered in America, as for example at Ancon on the coast of Peru (47). Like many other things this goes to show that in America ceramical art has undergone a development that has not only been artistic but also embodied an addition of new inventions. If the mere knowledge of the simplest kinds of ceramics had reached America from the Old World, then the ceramic inventions just referred to must be American, or else they

Fig. 18. Quipu from the Chocó Indians, each knot representing one day. ($\times$ 2/3) G. M. 27. 27. 796.

must successively have come from the Old World to America. If so these ceramic inventions must have been introduced into Peru or Central America as it is evident, judging from the process of distribution, that it is from those parts they orginate (48).

The manioc-grater must, as I have already said, be an American invention. It is also interesting to note how this invention has been improved upon all the way from unworked, spiny, epiphytic roots up to well made boards artistically encrusted with quartz splinters (fig. 19).

In the same way the manioc press is, as I have said, an Indian invention. Its distribution has in detail been studied

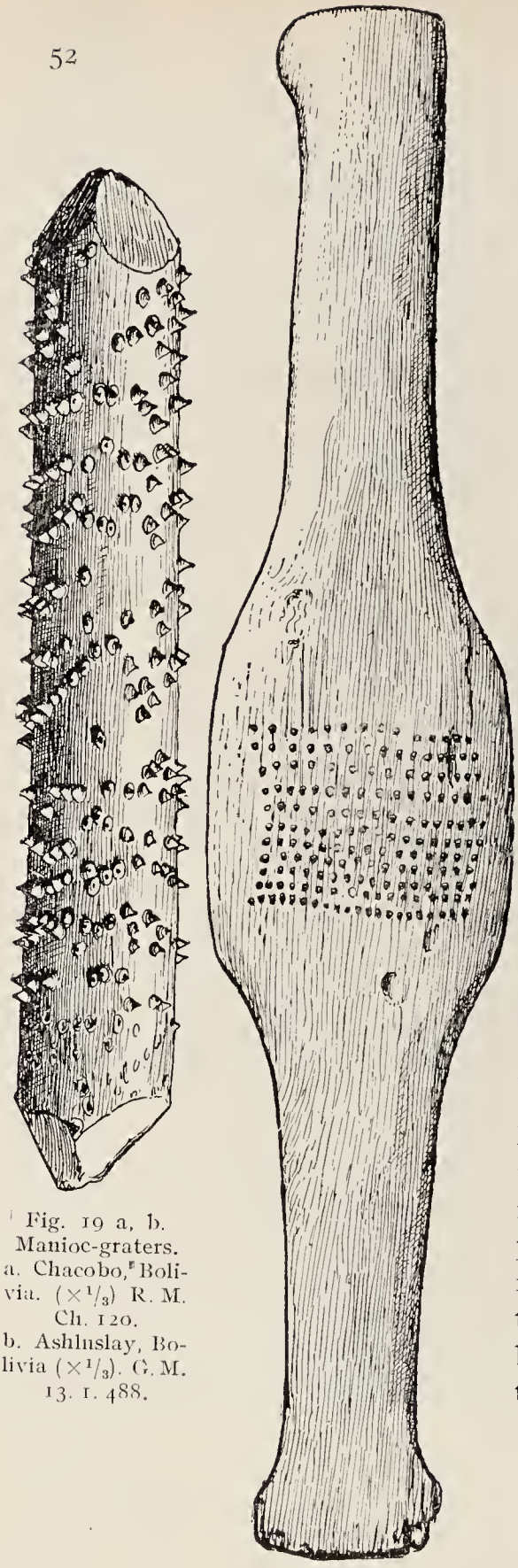


Fig. 19 a, b. Manioc-graters. a. Chacobo, Bolivia. ($\times 1/3$) R. M. Ch. 120. b. Ashluslay, Bolivia ($\times 1/3$). C. M. 13. 1. 488.

by Métraux (49), who points out that its origin appears to lie in Guiana. This invention is not known to the tribes inhabiting the upper Xingú, who squeeze out the poisonous juice through a basketwork sieve (50). The Uitoto, Yamamadi and Kayapó employ a very primitive form of press which Métraux no doubt rightly supposes to be more original than the well-known basket bag (51). These tribes, who as far as we know have not for a very long time had any intercourse with each other, inhabit the extreme edge of the distribution area of the manioc press. The migrations of the Guarani Indians have evidently contributed to the dissemination of the manioc press. To Central America it has only penetrated in post-Columbian times along with the Black Caribs trans-

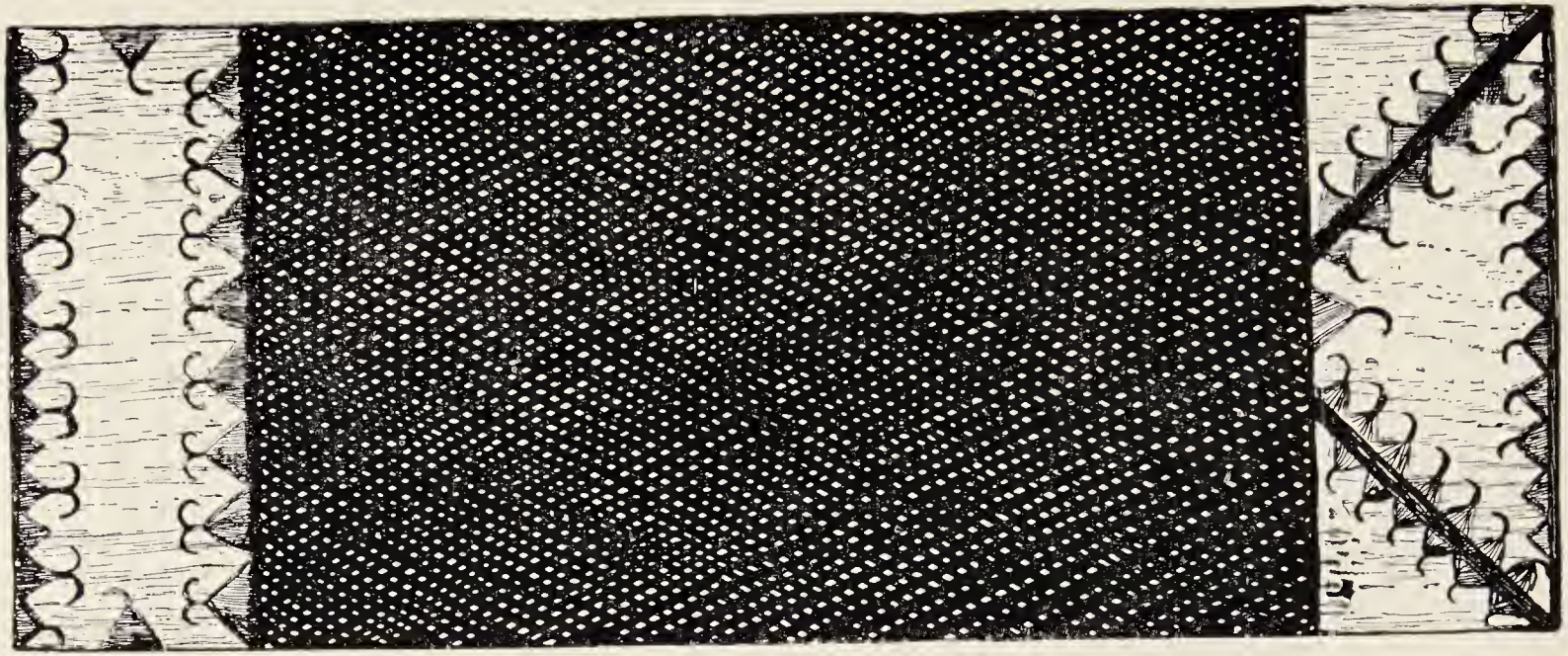


Fig. 19 c. Manioc-grater. c. Patamona, British Guiana ($\times$ $^{2}/_{9}$). G. M. 12. 1. 170.

Fig. 20. Enema tube, from the Chocó Indians, Colombia. ($\times 1/3$). G. M. 27. 27. 482.

ferred to that territory from the West Indies. Seeing that the manioc grater is found on the upper Xingú, it appears there to be older than the basketwork bag. Even of this utensil the highest forms are found in Guiana, whilst its simpler forms occur peripherally in its area of distribution.

A culture element of which I have made special study hereto annexed is the enema syringe. In this we have before us an invention that we are able to prove to be purely Indian in part, seeing that we know the rubber syringe to be an Indian invention. At the same time it is an invention of which in America there are two forms, namely the enema tube (fig. 20) and the enema syringe (figs. 4, 21), of which the latter is supposedly an improvement upon the former. In favour of the enema tube also being an American invention speaks the circumstance of it not being known either in Oceania or northern Asia. As regards the rubber syringe, it is an invention which was preceded by the hollow rubber ball.

In the foregoing I have shown the development or variation in form of several inventions that must have been made in America because they are not found elsewhere, such as the manioc press, the manioc grater, and the enema syringe made of rubber. I have also shown that the handle-holed copper axe was invented in America. Moreover I have pointed out culture elements common to America and the Old World which present a similar variation as to form, from the most primitive types up to the most elaborate.

In respect af several other culture elements much the same thing can be shown to be the case. I therefore wish to put the question: just

where did the foreign influence come into play; was it when the first attempts were made, or when improvements were being achieved — or must we suppose that these inventions have always been controlled form the Old World? For my own part I cannot but find it logical to suppose that such cultural elements as the liana bridge, the signalling gong, etc., have in the same way as the manioc-press and the manioc-grater been invented in America, and there successively improved. This way of thinking does not in any way preclude that pre-Columbian intercourse

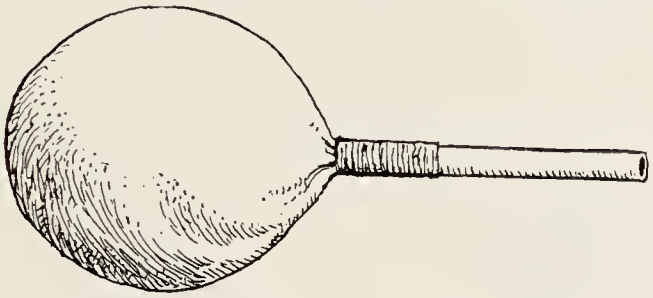


Fig. 21. Enema syringe, found in a grave at Ollachea, Peru. The tube is of reed, the bulb of leather. R. M. 06. 1. 490. Partly reconstruction.

existed between the New and the Old World, but only maintains that all common cultural elements are not necessarily derivable from a common origin.

Before passing on to inventions that appear to be American because of their having an isolated distribution in America, I wish to devote a few words to inventions that appear to be in some way connected because of being founded on the same principle. I intend to show how certain inventions may have been made.

CHAPTER IV.

Inventions founded on a common principle.

When the same principle is capable of being applied to two fairly divergent inventions, that circumstance may have been of importance as thereby one invention may have supplied the idea for another. Inventions that to us appear enormous leaps in human progress may in this way prove to be much less isolated than prima facie apparent. Of this I shall adduce one or two examples.

It is well known that the beam scale (fig. 22) as well as the Roman scale (52) were known in western South America at the time of the Discovery. This is evident from the literature of that period. The question then arises as to whether the beam scale is found in America as a fully completed invention or whether it was suggested by some earlier device. This, to me, seems to have been the balanced double-load pole.

It is evident that the carrying pole was in use in America at the time of the Discovery, and it was then still employed by the Seri Indians of Mexico. Of these Indians McGee (52 b) thus writes: "Ordinarily women are the water-bearers, each carrying an olla balanced on the head with the aid of a slightly elastic annular cushion, usually fashioned of yucca fiber, though in some cases two ollas are slung in nets at the ends of a yoke after the Chinese coolie fashion (this device being apparently accultural)".

From this it appears that McGee considers the "Coolie yoke" to be a post-Columbian culture element in America. This is certainly an erroneous opinion seeing that this con-

Fig. 22. Beam-scale from the coast of Peru. G. M. 25. 11. 8. The scales are of silver.

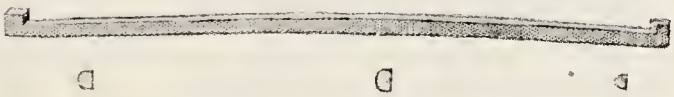


Fig. 23. Water-bearers yoke. Seri Indians. (After McGee.)

trivance is mentioned by Oviedo and other writers from Mexico and Darien even as early as the very beginning of the era of discovery (See Appendix 6). Oviedo in fact has depicted a man carrying a load by means of such a pole (fig. 25).

Fig. 24. Darien Indian carrying by means of the "Coolie yoke".

It is a very noteworthy circumstance that this mode of carrying loads, of such common occurrence in eastern Asia, was practised in America at the time of the Discovery. That the Indians of northern Mexico did not merely by chance happen to employ this method of carrying burdens

Fig. 25 A. Indian carrying a load by means of the "Coolie yoke." (After Oviedo, Vol. 1. Lam. 2, fig. 8.)

is evident from the fact that they suffered terribly when the Spaniards compelled them to carry loads on their backs, a thing they were entirely unused to.

When it comes to carrying loads the Indians are very conservative and by no means ready to adopt any novel method instead of the old. For such a change very special and compelling circumstances must be at hand. That any

people should suddenly adopt carrying by means of a yoke pole, I take to be an untenable theory. It is not likely that such a mode of carrying be employed unless it has been acquired as a habit from early childhood. The method of carrying with a balanced pole is probably a very ancient custom. Pointing to this is the fact, as I have already mentioned, of its being used by the Seri Indians who are one of the most primitive peoples in the whole of America.

An interesting question to find an answer to is, as said, the following: Did the balanced pole inspire the Indians with the idea of the beam balance?

The scales presuppose a need of determining the exact weight of some object. Seeing that we find the beam balance and the steelyard in western South America where the Indians were great metallurgists, it may well be supposed that the principal use of the beam scales and the steelyard was the weighing out of different metals for making alloys. It is very significant that Oviedo mentions the steelyard, in Colombia, just from those Indians whom he praises for being skilful goldsmiths (53). The same may be said of the Indians of the Peruvian coast, where, as mentioned, numerous scales have been recovered. A rough method of weighing occurs even among primitive tribes who do not possess any proper scales. This is done by comparing the weight of two loads from alternately lifting them, as for instance by carefully feeling the weight of one blowgun, and then the weight of another, and so on.

A rough-and-ready kind of "beam balance" that we all are apt to make use of consists of our hands, as when comparing the weights of two objects by holding one in the left hand and the other in the right. This is so natural an action that even Indian children in this manner weigh out any commodity, for instance sugar, that they wish to divide fairly. My wife tells me that she has often seen this done.

From this nature's own weighing apparatus the step to

scales proper is however a wide one. I have however, as I have said, asked myself the question whether there exists no Indian invention that may have inspired the idea of the beam balance, and thus has occurred to me the carrying pole. It consists as we know of a pole carried across the shoulder and with a load suspended from either end. In northern Mexico the Indians occasionally had a net bag attached to either end of the pole, just as sometimes seen on Peruvian beam scales. I therefore wonder whether it be not possible that it is this kind of carrying contrivance that has given the Indians the idea of the beam balance.

The fact that we have no instance of the carrying pole and the beam balance occurring in the same locality does not preclude that the former may have suggested the latter because the distribution of the beam balance in America was probably greater than we have so far ascertained and because it is also possible that the carrying pole, which appears to be a very ancient culture element, formerly also has occurred in western South America. For in Darien, at all events, it formerly was found.

In the carrying pole as in the beam balance the same principle is present. Supposing we have before us a carrying pole with two loads, "A" and "B", these loads must be of equal weight if they are to be carried comfortably, provided the centre of the pole rests on the shoulder. If "B" has to be exchanged for "C", then the weight of "C" must equal that of "B" and consequently also that of "A". That the carrying pole was used for establishing certain standard weights has been shown by Oviedo (54). He relates that Indians in the Province Chameda (Sonora) did their carrying by means of these balanced poles, and that they handed over to the Spaniards 30 loads of fresh fish, each load weighing one-and-a-half arroba.

From this we see that in America the beam balance did not constitute an entirely isolated invention, but that its bearing principle is embodied in that simpler implement, the

carrying pole. As to whether the latter, which probably is a very ancient culture element seeing that it occurs among a tribe of such primitiveness as the Seri, was independently invented in America is a question upon which I do not here propose to enter.

After all, it may well be considered that a greater leap in cultural progress is represented by passing on to the carrying pole from some other method of carrying loads, than in inventing the beam balance on the basis of the carrying pole. In the former case it implies the exchange of something that has become an old-established habit for something which is new and involving the use of a different set of muscles than those it has been habitual to employ, whilst in the latter case there is nothing but a specialization as regards the possibilities of the carrying pole.

An invention universally looked upon as being extremely remarkable is that of moulding by the method known as "à cire perdue". At the time of the discovery of America this method was known through large portions of the cultured regions in Central and South America. It should, however, at the same time be noted that casting metal in ordinary moulds was known in the same regions, and that it was even more widely distributed than the cire-perdue method.

I have given much consideration to the question whether the American Indians, in some part of the continent or other, may not have possessed some kind of moulding that might be considered as an embryo of the cire-perdu method, and thus have given the inspiration to invent the latter, and this has led me to think of the method employed in the manufacture of rubber balls and rubber syringes, two inventions of undoubted Indian origin, seeing that they were not known in the Old World prior to the discovery of America. A hollow rubber ball is made by the Indians by shaping clay into a round ball, which is then covered with a coating of rubber. This is then made to coagulate in the smoke over a slow fire, whereupon the rubber is pierced and the clay

washed out. This leaves only the rubber shell remaining. The aperture through which this core of clay in this way has been removed is then closed with a clot of rubber so that the walls of the rubber ball become airtight. When once the Indians possessed hollow rubber balls they could find no difficulty in inventing the rubber syringe which is nothing more or less than a rubber ball with a hole in its wall. This very process of washing out the clay core in the manufacture of the balls may have inspired the idea of using a ball as a syringe.

In the moulding of the hollow rubber ball, as in the cire-perdue process, there is the same idea of a core which is dissolved when the moulding has been performed. For the rest I am ready to admit that there is a far cry from the shaping of a hollow rubber ball to the casting of a hollow article of metal, but it is not beyond the bounds of possibility that some Indian metal-moulder may from the moulding of hollow rubber balls have received the idea of moulding metal à cire perdue. Moulding of hollow rubber balls and syringes is known from the upper Amazonas and from other regions of Amazon basin.

If it could be shown that the moulding of rubber balls on a dissolving core has been capable of suggesting the idea of casting metal à cire perdue, we should possess yet another proof in addition to the many adduced by Rivet (55) that the Indians east of the Andes, in their relations with the higher civilization in the west, were not only receivers but also givers.

If I did not misunderstand a Tsirakua woman whom I met in 1908 on Rio Parapiti in El Gran Chaco, who had formerly been a captive among the Yanaygua Indians, she had moulded a small round clay vessel by way of coating a waxen ball with clay. The whole then being burnt in the fire, the wax had run off and a spherical clay vessel resulted.[1]) Also in

[1]) It may be asked whether hollow clay balls, as well as hollow rims and feet on clay vessels, may not occasionally have been produced in this manner.

this a starting-point for the cire-perdue process may be found. It is a moot question whether the Tsirakua Indians, too, have not received the idea of moulding clay vessels on a perishable wax core from the process of moulding hollow rubber balls. Gathering honey and wax from wild bees is a matter of great importance to these Indians.

If it be found that the method of moulding hollow rubber balls may have suggested the idea of casting à cire perdue, then the invention of that method must have been made in Colombia or some neighbouring region, because I cannot find that hollow rubber balls were known in Mexico or Yucatan. According to Oviedo, the rubber balls of Haiti were solid (56). It is by no means improbable that Colombia is the country in America where casting à cire perdue was inaugurated, for in no other place did the Indians seem to have possessed such quantities of gold or so exceedingly beautiful works of the goldsmith's art, as is evident from narratives given by the earliest explorers and modern grave-despoilers.

It is of course conceivable that the Indians of the Amazonas may have received the idea of moulding hollow rubber balls from the employment of the cire-perdue method in metal-casting, and not vice versa, but I do not think this very probable.

What I have here said of a possible connection between the moulding of hollow rubber balls and the casting of metal à cire perdue may perhaps appear somewhat fantastic, but then I have mainly wished to point out that if we wish to inquire for the origin of any complex invention we should always search for rudimentary stages in similar inventions.

I have adduced these examples with the object of *showing how inventions might have been made, and not in order to prove the way they actually were made.* Even if such inventions as the beam balance and the methods of moulding à cire perdue were not originally native to America, then they must have possessed prototypes, and one is naturally inclined to hunt

for other inventions founded upon similar principles. There is nothing that favours the theory that other peoples would have found it easier than the Indians to make these inventions.

Inventions founded on the same idea but of different origin.

Fig. 26. Wooden pincers. a. Chocó Indians, Panama ($\times 1/4$.) G. M. 27. 27. 135.
b. Yamana Indians, A Fuegian tribe. R. M. 11. 1. 228.

The same principle may be applicable to some tool or other occurring among a number of tribes, and yet there is much that argues it being in every instance a case of an invention with an origin common to them all. I may, for exemple, say a few words regarding different forms of pincers in South America (see Appendix). Pincers are used among the Ona and the Yamana for picking out of the fire hot objects like mussels, pieces of meat, etc. (fig. 26 b) In large regions of western South America the Indians had, and still have, metal pincers for plucking out hairs of the beard. Pincers, made from mussel shell, and used for the same purpose, are known from Araucania and Guiana, and, judging from the shape, of the metal pincers of Peru their prototype appears also to have been mussel shells. (57). The Cuna, Chocó, Rama and Guatuso use wooden pincers for picking out of the fire hot mussels, bananas and such like (fig. 26 a). These are however different from the pincers used by the Ona and Yamana. The latter tribes use a split tree-branch for pincers, whilst the Chocó and the Indians of Central America employ a double-bent sliver from the stem of a small palm(?).

Garcilasso (58) expressly states that the Incas used no pincers or tongs in their blacksmith-work, and pincers of the type mentioned above from the Cuna, Chocó, etc., are not known from the regions of the Incan realm, nor from anywhere within the Amazonas area.

The pincers of the Chocó are probably of post-Columbian origin seeing that the name those Indians have for pincers is the Spanish word "tenaza". As the mussel shell pincers appear to be the prototype of the metal ones that the Indians used for plucking out the beard, it follows that the wooden pincers of the Ona, with their entirely different form, size and purpose for which they are used, can have no origin in common with those of Peru.

In America pincers must necessarily originate from three entirely different sources, viz.:

1. The wooden pincers of the Ona, whose origin is unknown;

2. Mussel shell pincers, subsequently imitated in metal;
3. The wooden pincers of the Chocó and Cuna, which are post-Columbian.

It will thus be seen that on any map showing the distribution of pincers in South America it is necessary to indicate precisely what type of pincers it refers to. (See Map 7)

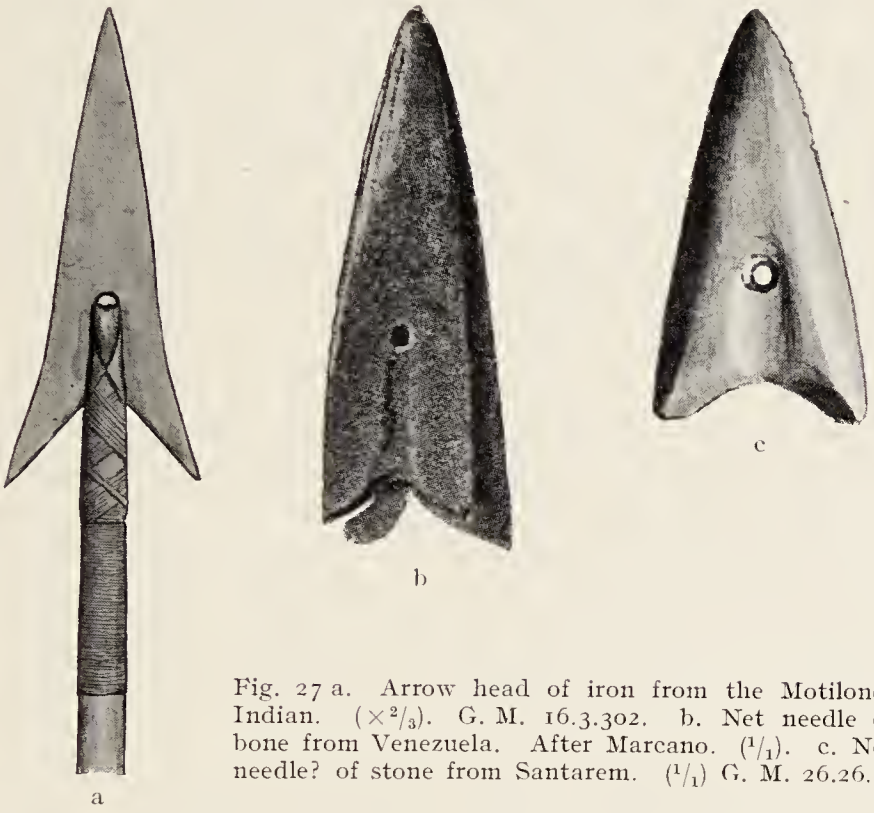


Fig. 27 a. Arrow head of iron from the Motilones Indian. ($\times^2/_3$). G. M. 16.3.302. b. Net needle of bone from Venezuela. After Marcano. ($^1/_1$). c. Net needle? of stone from Santarem. ($^1/_1$) G. M. 26.26.3.

Judging from the article under the heading of "Pincers" in the "Handbook of American Indians" it appears that many different types of pincers also are found in North America. In that continent it is even more difficult than in Central or South America to determine to what extent the idea of employing pincers may have been derived from the whites.

Very occasionally two objects may be of exactly similar form but still put to entirely different uses. If we look, e. g., at fig. 27 a, we see that it represents an arrow-head. In

fig. 27 b on the other hand, if Marcano (59) is correct, a net-needle or mesh-pin is reproduced. These two objects are unquestionably of entirely different origins, even though the arrow-head, which is of iron, and consequently of a post-Columbian type, once had a genuinely American prototype of some other material.

Perforations in the bottoms of clay vessels may, as remarked by S. Linné (60), have been made for entirely different purposes. The perforated clay vessel may be a strainer, or, e. g., a portion of a steam-cooking apparatus. Two fans may be of very similar appearance, though their uses are different. In Oceania the fan is above all an instrument for producing a cooling air-current, while among the Indians it is always used for blowing the fire.

CHAPTER V.

Inventions of isolated distribution.

Of the greatest interest as regards the question of parallelism, and of the same inventions having been independently made at different times, is when we meet with an invention entirely, or almost entirely, confined to a small locality within a whole continent. An invention of this description is the pump, in Colombia. There it was met with at the time of the Discovery within a very restricted area, where it was used for quite a specific purpose. Under those circumstances it is out of question that there existed any connection between these Colombian pumps and those of the Old World.

Cieza de Leon (61) describes the Colombian pump in this way: "Farther on there is another village, called Coinza, past which run several streams whose waters are very peculiar. Here I noticed a certain thing (which I admired not a little) and that was that in these streams, and from the source supplying the water that runs in them, there were welling up salt springs, and into these the Indians, with great ingenuity, had put down hollow stems of the thick bamboo that grows in these parts, resembling ships' pumps, through which they raised the water they wished to obtain, keeping this water from mingling with the body of the river water, and from it they produced salt".

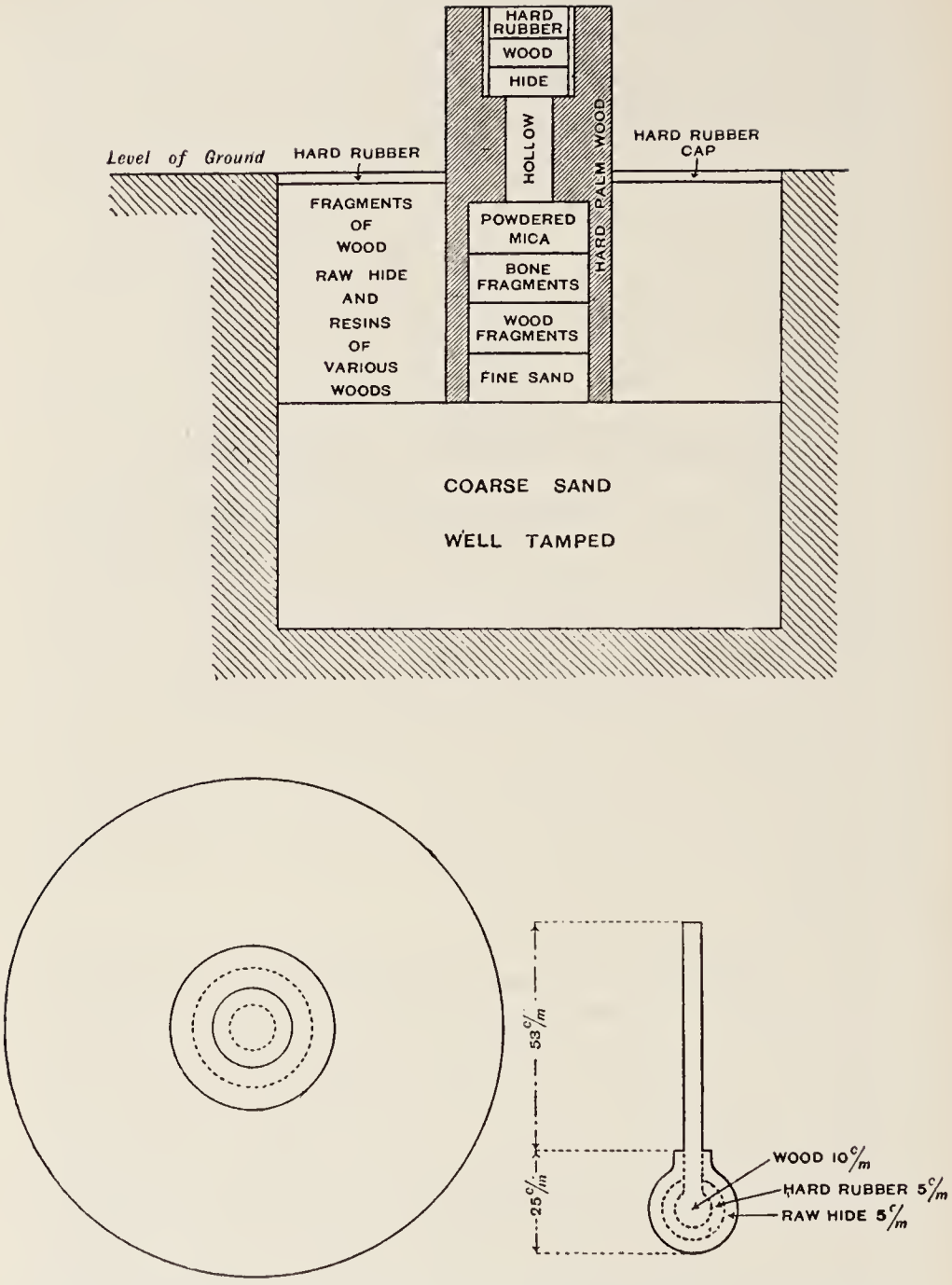


Fig. 28. Signalling gong from the Catuquinaru Indians. After Church. This gong or drum is, as apparent from the drawing, partly buried in the ground.

If I have rightly understood Cieza de Leon, those salt springs run along the bed of the river, that is to say underneath the fresh water, and from there the Indians pumped up the salt water by means of bamboo waterpipes without getting it mixed with the river water. He says that these pumps were like those used on board ships by the Spaniards. It is out of question that the Indians could have acquired the idea of this arrangement from the Spaniards because at that time — middle of the 16th century — the district referred to was entirely unexplored.

Here we have before us an ingenious local invention which, judging from everything, had been devised on the spot seeing that it was adapted to the singularly peculiar local conditions. Some gifted Indian had here most cleverly discovered a method of utilizing the salt water of the springs on the river bed. That this invention did not spread may safely be accounted for by its being devoid of purpose elsewhere than in conjunction with these extraordinary salt springs. The neighbouring tribes would have had no use for it.

Fig. 29.
Gocart. for children, from the Baniva, Northwestern Brazil. G.M. 28.1.164 b.

One of the most remarkable local inventions known from South America is the well known signalling gong (fig. 28), discovered by Bach and described by Church. (62). That it was independently invented in America is proved by its not being known in the Old World. Pater Koppers (63), in fact, admits it to be a local invention.

The gocart for children (fig. 29), which Koch-Grünberg describes from northwestern Brazil, does not appear to be known from any other part of America. Other local inven-

tions from the same region are a kind of table (64) and the pronged cigarholder (fig. 3). Of the latter we know that it was invented in America. As regards the former, the same is also probable because of its localized distribution in the interior of the South American continent.

Of very remarkable isolated occurence in South America is the barbed fish-hook. Barbless fish-hooks are widely distributed in South America, but hooks provided with a barb are so far as I know only described from the very ancient fishing culture in Arica, Chile, that first was described by Uhle (65). Probably this is a case of an isolated invention that never succeeded in "making good" or spreading farther. It is quite possible that among primi-

Fig. 30. Barbed fish-hook from the very ancient fishing culture in Arica, Chile ($\times {}^{2}/_{3}$). G. M. 20. 1. 25.

tive peoples in this way inventions are made that perhaps are used for a time but subsequently forgotten. They do not spread because of the Indians' disinclination to adopt novel ideas, or an invention may have been premature: it does not fit in, so to speak, with the rest of the culture.

The Huari are a small tribe in Matto Grosso who, when in 1914 I accompanied by my wife visited them (66), were still living in the stone age, but yet were the only primitive people in all South America with a knowledge of the chain (fig. 1). Attempts at making chains consisting of a couple of links in gold, are known from pre-Columbian times from Columbia and Ecuador (67), but otherwise the chain is not known either from the Incas, Mayas or Aztecs. In this we evidently have a remarkable invention of isolated occurrence.

The Yuracáre and the Chimáne of Bolivia employ a peculiar method of affixing the feathers some distance from the

nock on the arrow (fig. 31). This invention, which they have all to themselves, they must have made during the last hundred years because at the time of d'Orbigny's visit to them their arrow feathers were fastened in a different manner (68).

Another interesting example of isolated distribution connected with a specific purpose is the following. We know that in the extreme north of North America the Eskimo and a few Indian tribes possess sledges with runners (69). In all the rest of America the sledge fitted with runners is unknown. One of the Fuegian tribes, the Alakaluf, possess however this vehicle in an embryonic stage, as their plank boats are provided with runners in order to facilitate their being drag-

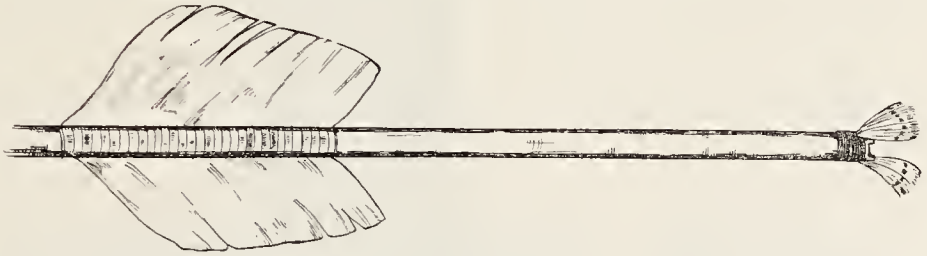


Fig. 31. Feathering of a Yuracáre arrow R. M. Y 204 (× 1/3).

ged overland from one water to another (fig. 32)[1]). A plank boat fitted with runners is a sort of a sledge, and it is probable that the Alakaluf have made an independent invention for a specific purpose. The origin of the Eskimo sledge is on the other hand presumably to seek in the Old World.

Many other examples similar to the above might be adduced.

As has already been pointed out by Max Schmidt (70), it is of great interest to study the form variations in such implements as have a two-fold purpose. An implement may at first have been used for a certain purpose and subsequently for another, a procedure likely to entail modifications. Wegner (71) mentions from the Siriono Indians an implement partly used as a digging-stick and partly as a pestle. Should

[1] Sledges are quite well capable of being used on other surfaces than ice and snow. In Sweden they are used, e. g. in Dalsland, for transportation of timber in the woods even in summer when the ground is bare.

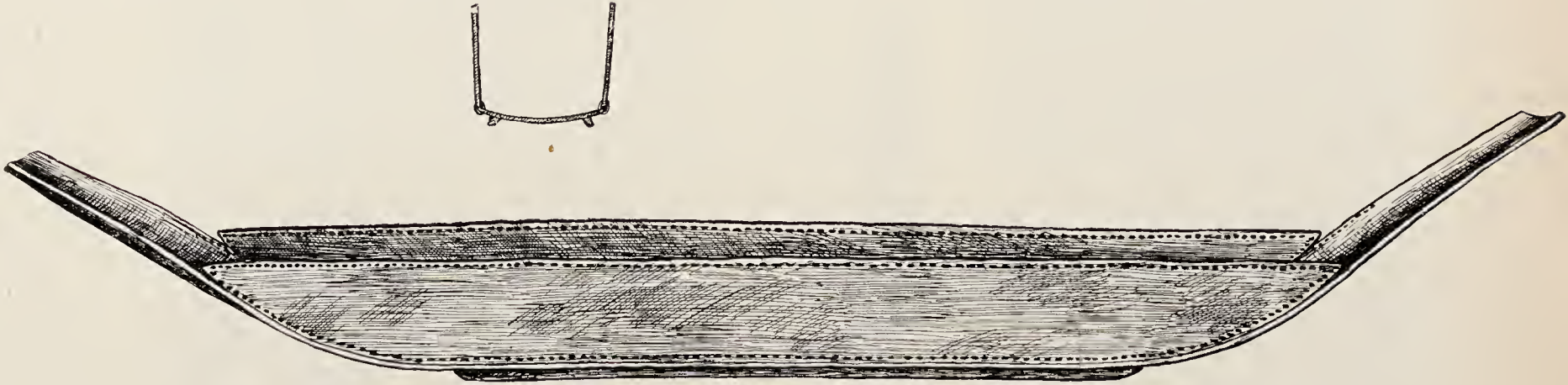


Fig. 32. Plank-built boat, with runners to facilitate dragging overland from one water to another. From the Alakaluf, a Fuegian tribe ($\times 1/20$)

for some reason or other it be used exclusively for one purpose, its form would probably be affected. The Indians on Lake Titicaca used triple-pointed poles that are used both as fish spears and to punt their raft along (72). It is not at all unlikely that it is the multi-pointed pole which has suggested the fish spear. These poles are multi-pointed in order that they may be used in swamps, to punt their canoes along. It was natural that the Indians should try with these poles to have a thrust at any fish they might see. Then, if they migrated to a district where many-pointed poles were no longer needed, these poles lived on as fish-spears.

Lastly, in this connection, I wish to bring forward as examples of the Indians' ability as regards inventions a few minor achievements in that line made by them in post-Columbian times on the basis of newly introduced culture elements or new raw material obtained from the whites.

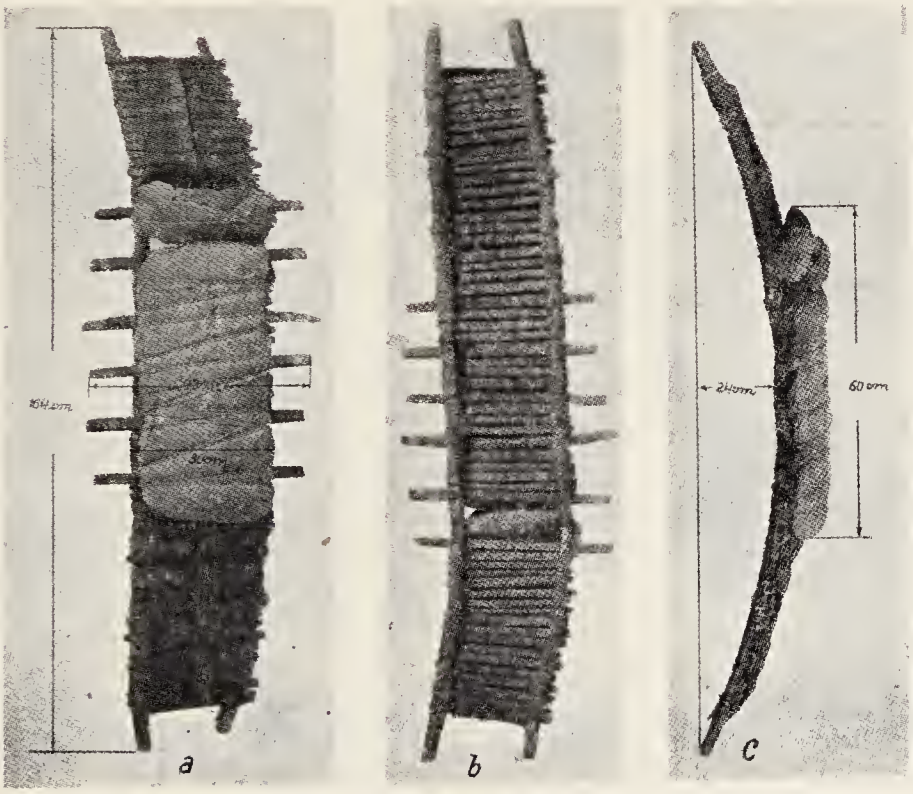
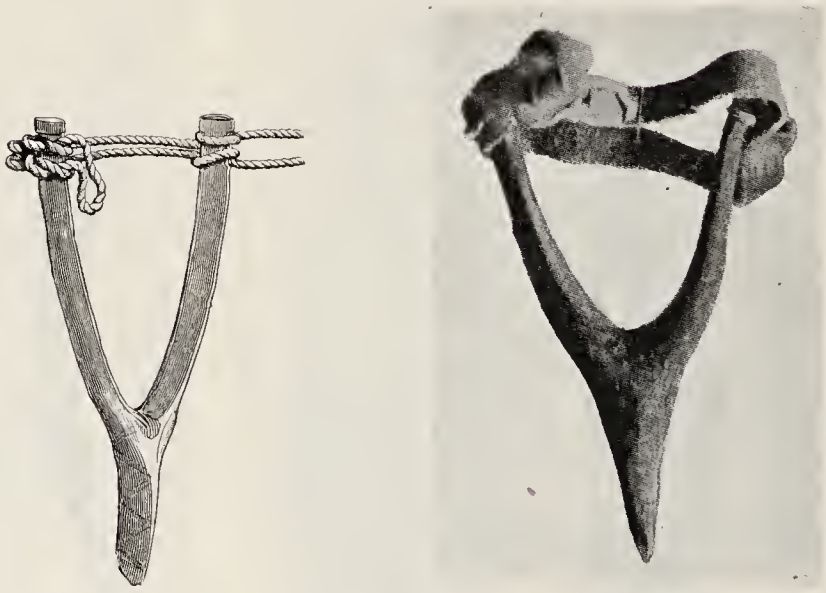


Fig. 33. Baby-carrier for use on horseback. From Patagonia. (After Hauthal).

Fig. 34. Baby-carrier, used on foot, from the Ona Indians. (After Hauthal.)



35 a 35 b

Fig. 35. a. Wooden spur used by the Ashluslay Indians of El Gran Chaco ($\times 1/3$). G. M. 13. 1. 429. b. Wooden spur used by the Pima Indians of North America. (After Russel.)

Fig. 36. Pump-drill with a movable disk. From Californian Indians. (After McGuire.)

CHAPTER VI.

Post—Columbian inventions made by the Indians.

In Patagonia the Indians have invented a baby-carrier for use on horseback (72 b) (fig. 33), which is a modification of the ladder-like baby-carrier they previously used on foot (fig. 34). This is an invention they could not have borrowed from the whites. The horse being post-Columbian, the baby-carrier for use on horseback also, must be post-Columbian. The Patagonian have spurs of a very strange type. (73) The Mocovi Indians formerly had very simple wooden spurs and in our days, for example, the Ashluslay Indians of El Gran Chaco, as well as the Pima Indians of North America (74) have spurs of identical types. In this

case Indians of different parts of America have, independently of one another but naturally under Spanish influence, arrived at the same result (fig. 35). In California the Indians have invented a pump-drill with a movable disk (fig. 36), which supposedly is a modification of the type of pump-drill the Indians have seen the whites using (75). The Chiriguano have modified the Spanish dice according to their own particular taste (76). The Tapiete and the Toba manufacture cleverly contrived boxes of armadillo tails which they use as containers for tinder when

Fig. 37. Tinder box of Armadillo tail.

they strike fire with flint and steel, an art which they have learnt from the whites (fig. 37). These tinder boxes must have been invented in post-Columbian times.

As is well known, snow goggles and eye-shades are common among the Eskimo and a few Indian tribes in the extreme north of North America. (77). In South America eye-shades are only known from the Carajá (78), who use them for protecting their eyes when staying on the sun-flooded banks of Rio Araguaya. These shades are woven from palm leaves (fig. 38). In the high mountain regions of Bolivia and Peru, where snow is very prevalent, the Indians

do not know of any way of protecting their eyes so that snow-blindness is consequently very common among them.

For protection against the sun the Carajá also use a kind of openwork woven hats. The plaited hat, where it occurs among the Indians of South America, always appears to be an imitation of the hats of the whites. I suppose the same applies to those manufactured by the Carajá. In this case

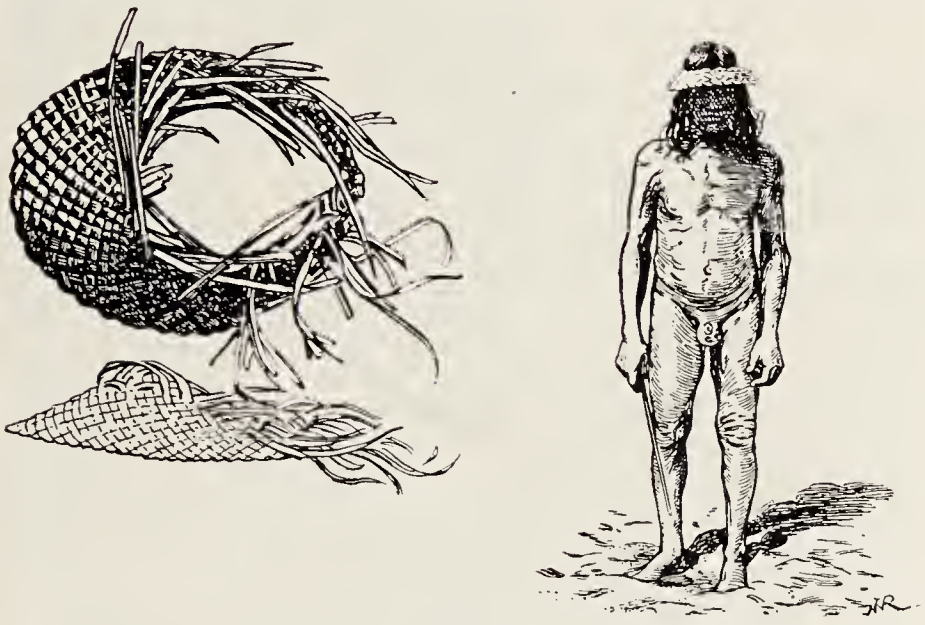


Fig. 38. Carajá Indian with eye-shade. (After Krause.)

the eye-shade is nothing but an incomplete hat. It is typical that the eye-shade is unknown to the more isolated tribe of the Šavajé. Neither does Krause mention the hat from these people. Hats manufactured by Indians I have seen among the Mojo, Churápa and other tribes in Bolivia and among the Bogotá on the Isthmus of Panama. Such hats are, among others, also made by the Motilones. This tribe decorate their hats with feathers. All these tribes have learnt from the whites how to make hats. Hats are not known from any tribe uninfluenced, or but slightly influenced, by the white man's civilization. Nowadays civilized

or half-civilized Indians are everywhere seen wearing hats which they have bought at the white men's stores. But to them the hats is however first and foremost an ornament which is not used in hunting or fishing or generally in their daily avocations.

Fig. 39. Patamona Indian with sugar-mill. British Guiana. (Photo Thulin)

The occurrence of the eye-shade among the Eskimo and the Carajá furnishes us with a good illustration of double occurence where we are able to show that no connection exists between the two areas of distribution. Here the Carajá, influenced by something that they have learnt from the whites, have achieved an independent invention.

With all possible reservation in case I am mistaken I wish to put forward a few observations that are suggestive of the Indians having in post-Columbian times invented or for a specific purpose adopted a particular kind of sugar-cane crushing mills.

Fig. 40 a. Sugar-mill from the Cuna Indians. Panama. (Photo E. N-d.)

Sugar-mills of the type I here reproduce (fig. 39) are fairly widely distributed in America, as will be seen from the map. (See appendix 8) They are especially common in Guiana. Personally I have seen mills of this kind in the Isthmus of Panama among the Cuna (fig. 40) and a small Indian tribe, the Chama (fig. 41), on Rio Madidi in the bor-

der regions between Peru and Bolivia, who shortly prior to my visit among them in 1914 had concluded a peace treaty with the whites. Sugar-cane presses of the same type have been observed by Tessman among the Pano-speaking Indians on the lower reaches of Rio Ucayali.

We know that the Indians first received the sugar cane from the whites. One is therefore apt to suspect that it is from them they got to know the sugar-mill of this kind. Ne-

Fig. 40 b.

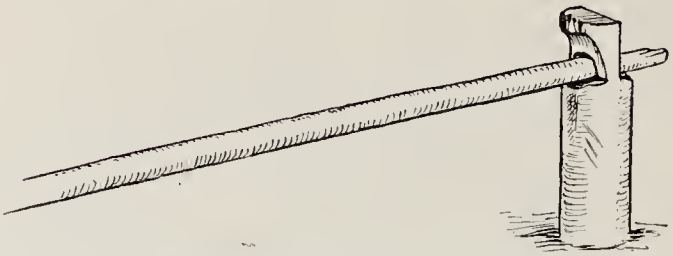


Fig. 41. Sugar-mill from the Chama indians. Rio Madidi.

vertheless I have never seen mills of this sort in use among the whites. And Dr. Roth, the eminent expert on the ethnography and history of Guiana, is of the opinion that the Indians did not receive them from the whites. In a letter to me he writes as follows:

"Of course from the historical point of view there is no doubt that the Spaniards (commencing with Columbus) introduced sugar culture, but it by no means follows from this that they introduced the hand-mill you mention, which can only be served by a length of say 4 to 6 feet of cane at a time. It surely would require dozens and dozens of such mills, an

incalculable number of slaves, and Heaven knows how many weeks, to squeeze the sugar out of even a small-sized plantation".

As against this, Mr. Roth is inclined to believe that the Indians have received these sugar mills from the negroes, seeing that they are commonly used by the bush negroes. The prominent African specialists Seligman and Lindblom have however written to me saying that sugar-mills of this type

Fig. 42. Sugar-mill from the Caribs on the upper Pomeroon. (After Brett.)

are not met with among the negroes in their own continent. Neither are similar sugar-mills, according to Seligman, known from New Guinea or elsewhere in the whole of Melanesia.

Thus it only remains that they must be autochthonous to America and that they have there been invented by Indians in post-Columbian times when they became acquainted with the sugar cane through the whites. The Bush-negroes have probably, in there turn, got the idea to use these mills from the Indians.

There seems to be no possible way of explaining the occurrence of this mill among the Chama on Rio Madidi, especially

as mills of this kind have never been used by any other Indian tribe, or the negroes, living in their neighbourhood. There one could suspect a pre-Columbian culture-element before the sugar canes were imported, used for another purpose.

It is also interesting to note who are the Indian tribes that, since they have come into contact with the whites, have begun to use arrow-points made of iron. Those whom I know from my own experience are the Toba, Choroti, Ashluslay and Mataco, who have arrow-heads partly of knife-blades and

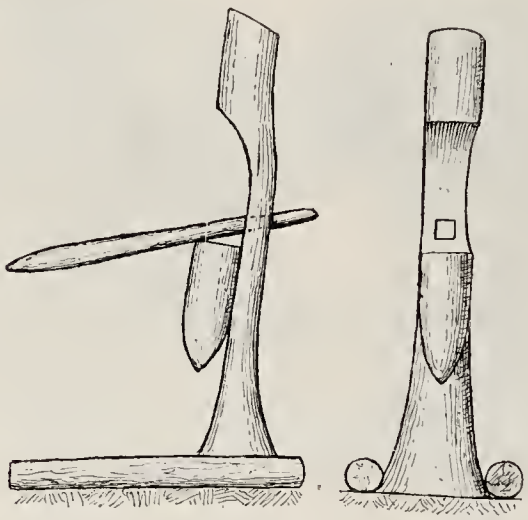


Fig. 43. Sugar-mill from the bush-negroes. Kaaimanston Dutch Guiana. (After Bakhuis.)

partly of wire. More rarely the Chiriguano and the Bogotá, too, have their arrows pointed with iron.

Apart from the above, in the Gothenburg Museum we have iron-pointed arrows from the Chimila, Baniwa, Goajiro, and others.

Of the above mentioned tribes the Motilones mostly have iron points on their arrows.

A study of this matter will reveal that many tribes who only have had very slight contact with whites, such as the "Bugres" in southern Brazil and the Umotína (79) of Matto

Grosso, have their arrows pointed with iron, whilst other tribes who are, and long have been, in contact with whites never use iron points on their arrows. Iron points have evidently been adopted, here and there, by many tribes, and

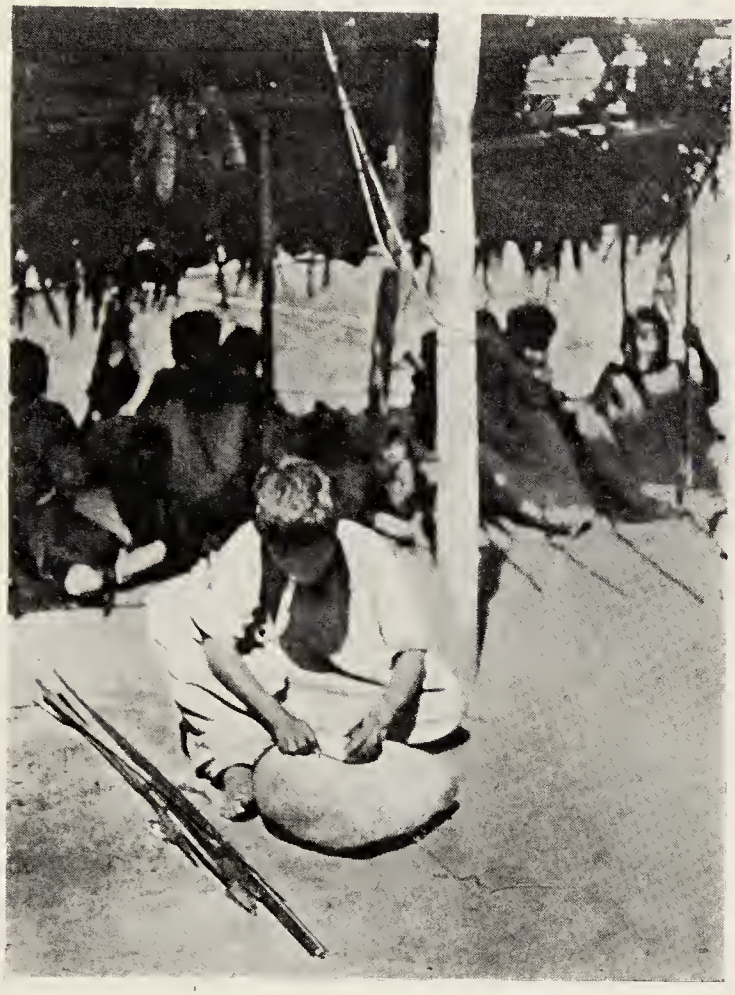


Fig. 44. Motilon Indian making a arrow-head of iron. (Photo Bolinder)

they have as a rule done so independently of one another. By different methods they have solved the problem of fastening the iron point to the shaft. The Motilones fix the arrow-head by means of a hole pierced through it (fig. 27 a), whilst other Indians, as for example the Chaco tribes, insert the iron point

into the shaft and then overlay the joint with a winding of thread. Occasionally a special extra binding is employed in order to guard against the precious point getting lost.

The method employed by the Motilones in manufacturing their iron arrow-heads has been described to me by Dr. Bolinder, who writes as follows: "The Motilones cold-beat their arrow-heads and grind them with moistened sand placed on a stone, until the desired sharpness is obtained. They are generally made of steel, that is to say old knife-blades, but for the smaller ones may also be used soft iron which is beaten out cold for a long while, whereby it may be supposed

Fig 45. Fuegian axe, consisting of a piece of iron fitted into a handle.

to become harder. I enclose herewith a photograph of the cold-beating process which is carried out by means of a stone just big enough to fit the hand of the worker (fig. 44).

Nowadays the hole is drilled with a wooden stick to which has been lashed an iron tang, often the blade of a pair of scissors, an instrument the Indians have not grasped the meaning of, or, perhaps more correctly speaking, not found any use for in its ordinary form. The stick with the iron tang is rotated between the palms in the way usual in fire-drilling.

Before certain sections of the Motilones came into contact with the whites (1915) they were exclusively dependent on robbery for their supply of iron. This they frequently obtained in large quantities as they, whilst the whites were engaged

in their revolutions, used to pillage entire villages. Raiding for iron was of common occurrence, and every slain wayfarer meant an additional supply of the metal. Certain implements, e. g. axes, were regarded as great valuables by the indians, and the first time we visited them we saw axes that had been so repeatedly ground that there was nothing much left of them. These had evidently been used during many years.

For small bird arrows, strips of tin-plate are used.

Nowadays it is of course easier for the Motilones to obtain iron, and ironware is disseminated by those who are in contact with the whites to others living farther inland among the mountains. In the latter parts it is however probable that iron is more scarce. But even there it may be supposed that the arrows used for bigger game or for war are of iron or steel".

Fig. 46. Iron knife from the Yuracáre Bolivia. ($\times^1/_3$.)

The Fuegian tribes were unacquainted with the stone celt. Nowadays their tools are exclusively made of iron, in part being manufactured out of scrap iron, and shafted by the Indians themselves. The Riksmuseum at Stockholm possesses an axe of this kind, consisting of a piece of iron to which a handle has been fitted, originating from some Fuegian tribe, probably the Yamana (fig. 45). It is interesting to note that the Fuegians have shafted this axe in the same manner as the Guayaki, Bakaïrí and others shaft their stone celts. The method of shafting is very simple, but nevertheless of great interest in case they have independently conceived the idea of this method which must have been unknown to them.

In this connection I wish to recall the fact that the Fuegian Indians after contact with the whites have not changed the material of their arrow-points from flint to iron but from flint to glass.

The Yuracáre have invented a very clever device for shafting bits of iron into knives with the edge set adze-wise (fig. 46), in ingenious imitation of the shafted teeth they had previously used. From cow-horn the Chiriguano, the Indians of Guiana, and other tribes have made clarinets and trumpets, the Choroti tinder-boxes with cleverly attached lids of

Fig. 47. Tinder-box of cow-horn with lid of calabash. Choroti G. M. 13. 1. 164.

calabash, and the Quichua receptacles for the lime that is chewed with coca. Of more common occurrence are direct imitations. In the Gothenburg Museum we have, from the Mataco-Vejos and the Huari, pieces of iron shafted by the same method as formerly were the stone celts of those tribes. Copying in this way was very extensively resorted to when the Indians of western South America passed from the stone age into a copper-and-bronze age (figs. 48 a and 48 b).

It is interesting to note how indispensable iron has become to such Indians as once have made its acquaintance. The Tsirakua, Siriono, and Itene — three tribes on not inconsiderably different cultural stages, who were hostile to the whites at the time I journeyed in Bolivia — organized their raids in order to obtain iron. In 1914 I saw a rubber-workers' barracks that had just been looted by

a b

Fig. 48 a. Stone axe. Tarapoto, Peru G. M. 26. 17. 15. 48 b. Bronze axe (tin. 0.39 %.) G. M. 26. 7. 4. Rio Cumbaza, Peru.

Itene Indians. They had carried off with them every nail in the building: thus precious was iron to them.

Many other examples could be adduced in illustration of Indian capacity for making inventions, but I must content myself with those I have already brought forward.

In conclusion, to summarize what I have said in the foregoing, I think we must admit that the Indians' contribution — as discoverers and inventors — to the cultural

progress of man is considerable. It may even surpass that of the Teutonic peoples during the era preceding the discovery of America. It is a proven fact that the Indians have achieved many discoveries and inventions that in pre-Columbian times were unknown in the Old World. They have invented many things that are adaptations to exceptional geophysical conditions. They have further made a number of inventions in connection with culture elements that in post-Columbian times have been introduced to them by whites and negroes. Many inventions have in America such an isolated area of distribution that they may properly be supposed to have been made there. Seeing that the Indians have discovered and invented a great deal that was unknown in the Old World at the time of the discovery of America, it does not seem unreasonable to wonder whether they may not also have invented something or other that also was known there. The actual fact of their having done so is proved by it being possible to trace several inventions of that class from their simplest to their most elaborate forms. In the case of certain very important inventions it can be shown that in America they in all probablilty were preceded by simpler devices founded on the same principles.

I shall now pass on to speaking of such culture elements as the Indians have borrowed from whites or from negroes.

CHAPTER VII.

What the Indians have learnt from whites or from negroes.

To begin with, I propose to give an account of what we know as regards positive influence on the part of the whites and the negro slaves on Indian culture, an account of such cultivated plants, domestic animals, implements, etc., as the Indians have obtained from the Old World in post-Columbian times. In the first place I shall therefore deal with those of the culture loans which are historically verifiable. This will enable us to make observations as to the degree in which different culture elements were in demand, the manner in which these elements spread from tribe to tribe, the conservatism of the Indians — all observations which are valuable to us if we are to analyze culture loans that are not historically traceable in the same way as the post-Columbian ones.

Thus I shall not enter upon the deculturing of the Indians from white influence, but only upon their having from the whites received new culture elements and new ideas, which they have added to the structure of their own culture. To some extent I have already touched upon this point in an earlier chapter.

It is interesting to note that at least one cultivated plant, viz. the banana, and one domestic animal, the common fowl, spread with incredible rapidity over the greater part of South and Central America already during the first few decades after the first contact with the Europeans (80).

It is evident that the Indians from the very first visits by Europeans on the Brazilian coast obtained tame fowls, which multiplied and before long spread right across the continent. A few years later the banana was introduced into America, and almost equally speedily disseminated. Here we have examples showing how culture elements for which there is a real demand in a short time easily attain an immense dissemination. In the same way certain American cultivated plants, such as maize and tobacco, spread in an extraordinarily brief space of time over vast regions of the Old World. Many other European cultivated plants, as for instance the sugar cane, also proved exceedingly acceptable to the Indians.

Upon the methods employed by the Indians in working their cultivations the whites have exercised but slight influence. Occasionally one sees the Aymara and the Quichua on the Andean plateau use a very simple wooden plough. With this they probably became acquainted as early as in the 16th century, and do not seem to have much improved it. The plough was not known in America in pre-Columbian times.

It was exclusively Indians with a previous knowledge of agriculture that learnt to cultivate the European plants. On the whole it may be said that no independent non-agricultural Indians have become cultivators through influence from the whites. Neither do I believe it possible to point to anyone non-domiciled independent Indian tribe that has settled down in consequence of influence from the whites. Where Indians have obtained iron implements from the whites it is probable that in certain quarters they have enlarged their cultivations. It naturally proved easier to clear virgin forest with tools of iron than of stone.

Certain domestic animals of European origin very early came to play an important part in the life of some Indian tribes. Those Indians who as early as the close of the 16th century were roaming the Argentine pampas on foot, re-

ceived, directly or indirectly, horses from the whites and turned themselves into intrepid horsemen. The type of riding-equipment they then evolved seems to have conservatively been adhered to by them ever since. From the Spaniards they learnt the use of the lasso. One of their native weapons, viz. the bolas, gained in importance through the acquisition of the horse. Bows and arrows, as well as ceramic industry, very soon fell into disuse among these Indians.

The conversion of the Argentine pampas Indians into a nation of horsemen must have taken only a few decades. The initiative to this I am inclined to believe was set by the Araucanians, or even possibly by a private individual viz. one Lautario, a former equerry to Valdivia (81).

In the northernmost part of South America are located the Goajiro Indians, who are Arawaks and mainly subsist on cattle-rearing. It is however not known at what date these Indians first obtained cattle or how they subsisted at the time when whites discovered their country.

In El Gran Chaco the Indians possess cattle to a fairly large extent, although predominantly sheep, and also goats. It is probably due to the breeding of sheep that among them the art of weaving has had great upswing in post-Columbian times, without, however, its technique and ornamentation having lost their purely Indian character. In the Andean highlands the llama has in certain parts been substituted by sheep as well as goats. It is evident that both agricultural and non-agricultural tribes became horsemen and cattle-breeders through influence from the whites.

When the Europeans conquered South America they introduced European dogs, including bloodhounds, and in wide areas the native dogs were before long completely exterminated by the European dogs. That in so many Indian languages in Amazonas the dog is compared to the jaguar (82) must be connected with references to dogs of

European breed. The undersized and barkless American native dog would have been accorded too much honour by any comparison with the monarch of the primeval forest.

A European domestic animal which, as already mentioned, shortly after the discovery of America was distributed most rapidly over large portions of the South American continent was the barn-door fowl. Nevertheless, this domesticated bird can hardly be said to have become of any considerable importance among other Indians than very Europeanized ones. During the 16th century white fowls were sought after by the Indians on account of the white feathers which could be used for ornaments after having been dyed.

If it were possible to imagine that the whites, after having introduced these cultivated plants and domestic animals, all had left America, then their influence in these departments would have been considerable. Would that influence have proved equally far-reaching as regards implements, ornaments, dress, weapons, musical instruments, etc.? We may safely say that it would not.

Taking for example ornamentation, ever since the time of the Discovery there have been introduced into South America large quantities of ornamented printed cloth, disseminated by means of barter-trading. It is evident that the Indians as a rule, have taken no appreciable interest in these ornaments.

Such ornaments, or others of European origin, we find copied only among some very few tribes. The Aymara and the Quichua, who at the time of the discovery of America possessed a high culture — and who have been influenced by the whites ever since the Discovery — have, e.g., in their weavings copied several European ornaments, including the double-headed eagle of the Habsburgs (see fig. 49). It is noteworthy that they, in particular the Aymara, on the other hand were fairly unappreciative of the European ornamentation with plant motifs. The Cocama paint beau-

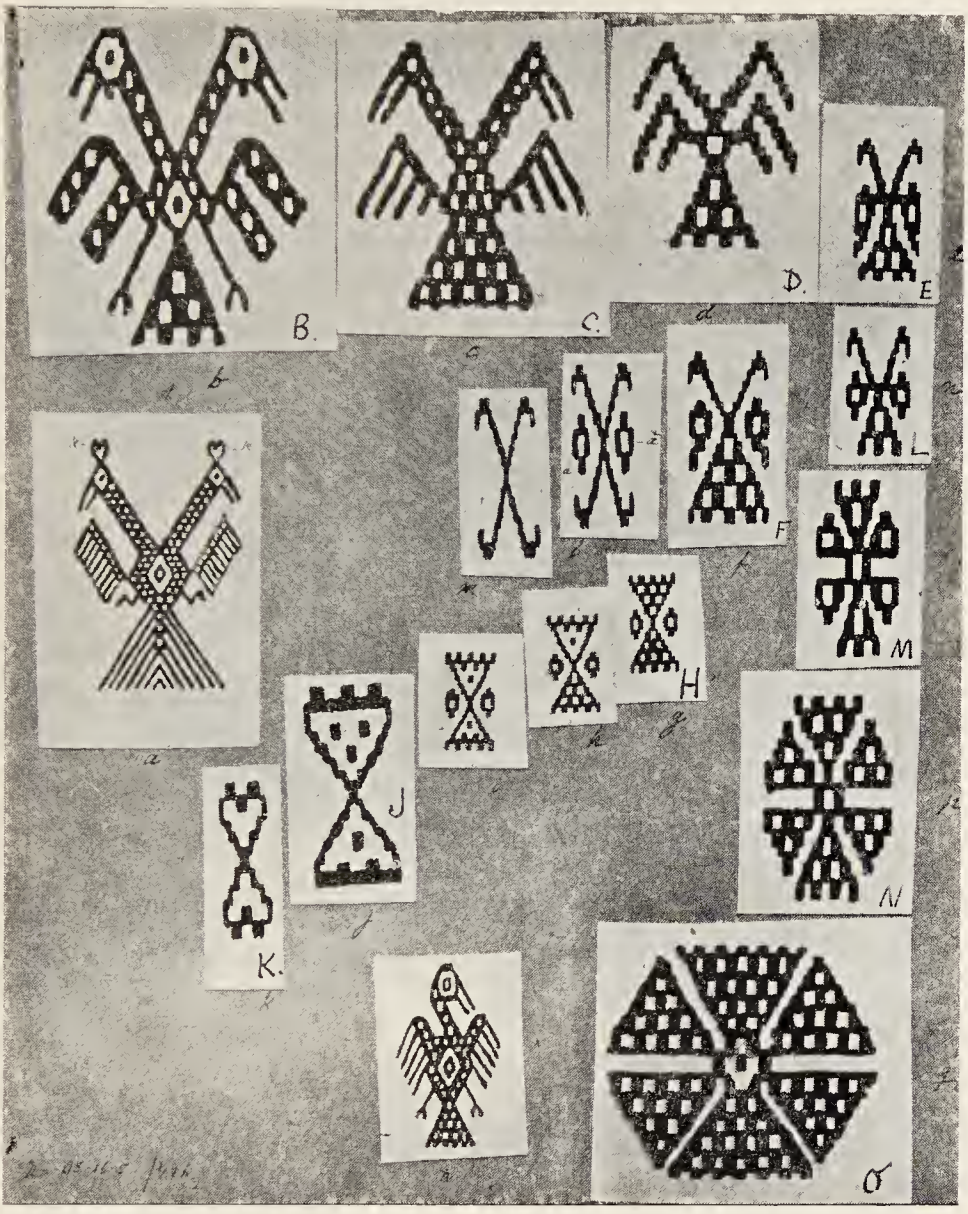


Fig. 49. The double-headed eagle of the Habsburg and its degeneration as an ornament on Aymara weavings.

tiful plant ornaments on their ceramics, and this ornamentation is no doubt a loan from the whites. In the same way the Caduvei have copied certain plant ornaments that they have probably seen during the mission era (83), i.e. the 17th and 18th centuries. The Cayapá, too, have borrowed some of their ornaments from the whites (84). On the other hand some Indian tribes of North America, in Canada in particular, have taken great interest in European plant ornamentation. It would be of great interest to find out

Fig. 50. Vessel with plant ornament from the Cocama Indians, Peru. G. M. 20. 7. 378. ($\times^1/_3$)

whether the Quichua and the Aymara did not adopt the alien, i.e. European, motives in their ornamentation during the 16th and 17th centuries and subsequently conservatively adhered to them. From what I can see, this appears to have been the case. When the Aymara and the Quichua copied those foreign elements, they applied them to textiles of ancient type without appreciably altering the form of the latter. The ornaments themselves, on the other hand, have frequently been conventionalized out of all recognition (fig. 49).

The majority of the Indian tribes of South America have however shown no interest whatever in alien ornamentation, and in the case of most of them it would still be impossible merely from their ornamental designs to prove that they have ever seen any European objects. This may

Fig. 51. Woman's shirt, "mola", from the Cuna Indians. Tupile, Panama. G. M. 27. 27. 886.

also be said of such tribes as for centuries have carried on bartering trade, or otherwise been in contact, with the whites, and who have seen innumerable examples of foreign ornamentation.

It is very characteristic that the women of the Cuna Indians have from the whites borrowed the shape of their

shirts, "molas", and probably also the appliqué technique by which the ornaments are worked in, whilst the style of their ornamentation is still purely Indian (fig. 51). When one sees anything different, it is a question of shirts intended for sale in the curio shops on the Panama Canal. The Chocó, for example, are often going about in wrappings or breech-cloths of flower-patterned cloth which they have obtained from the whites, but they never copy those ornaments.

A very interesting instance of European influence upon Indian ornamental art is known from the Payaguá Indians (85). The Indians of El Gran Chaco, who include the tribe just mentioned, have ever since the 16th century been surrounded by Indians strongly influenced by the whites. To the east of them the Jesuits possessed, during the 17th and 18th centuries, their most important missionary domain. From the early part of the 16th century they have themselves, directly or indirectly, been influenced by the whites. In the Chaco proper, missionary activity has however never been of much importance nor made any particular headway. Among the Payaguá Indians the Jesuits never had any properly established mission. Nevertheless, among all South American Indians these are the only ones who ornament, or, more correctly, used to ornament, part of their belongings with pictures out of Biblical history. There may be seen, e.g., representations of the Tree of the forbidden fruit, the Devil with horns and tail (fig. 52), Eve and the Serpent. What has entirely escaped the attention of hundreds of thousands of mission-influenced Indians, this tribe, or mayhap some single individual among them, has taken notice of. It is tobacco pipes used by their medicine men that the Payaguá Indians have ornamented with fairly artistic pictures from the Garden of Eden.

The circumstance of the Payaguá Indians having incorporated Christian elements with their ornamental art is, however, not *imitation* but *adaptation*. It nevertheless

constitutes a very rare exception. As a rule the Indians have most conservatively adhered to their own art as regards ornamentation. Similar conservatism is met with in other departments.

Fig. 52. Medicine pipe from the Payaguá Indians with pictures out of Biblical history. (After Outes.).

About the Mojo Indians in Bolivia, Eder (86), a jesuit of the 18th century, writes to the following effect: "Many observers have accorded the greatest praise to their exceeding skill in the art of weaving. All ribands, drapings, and such like textile manufactures that they obtained from Europe for use in their temples they duplicated most skil-

fully. They asked for a small portion of the textiles, cleverly separated the threads and unravelled the piece altogether, so that they could thoroughly observe the weaving technique and the way the different threads were interwoven. Then they would ask for woolen yarn in the same colours, and set up the threads over two pieces of wood which were joined together crosswise, and with this simple weaving-frame they carried out the entire piece of work."

In Mojos there is no trace to be found of any weaving technique that is not purely Indian, nor any non-Indian ornamentation on the weavings, and, taken on the whole, in spite of all mission influence Indian textile art has remained entirely untouched by the white man's culture. Nowhere has any improvement been made upon the weaving looms, but purely Indian methods have been religiously preserved. It is only quite sporadically that any positive European influence can be pointed to.

In many instances the Indians have embodied into their culture European or African culture elements. Among these are, e.g., the pellet-bow, the pump-drill, a primitive rope-spinning contrivance, stringed musical instruments, the cotton-cleaning bow, clarinet, certain side-blown flutes, tanning with bark containing tannic acid, appliqué technique, the crochet-needle and the straw hat.

The cotton bow and the pellet-bow, as well as the side-blown flute with six methodically fitted holes, are implements that in preceding parts of this Series I consider I have shown as constituting post-Columbian culture elements (87)[1]). The same applies to ordinary tanning with bark, i.e. with tannin. Appliqué technique, as has been mentioned, is known

[1]) That the pellet-bow in South America is a post-Columbian culture element is accepted by Métraux though not by Rivet. The latter has, however, made no attempt at refuting my arguments in support of the pellet-bow being of post-Columbian origin in America, and to that exposition I beg to refer the reader.

from the Cuna Indians, who use it on women's clothing and probably got it from the whites.

The crochet-needle is mentioned by Krause (88) from the Carajá, and as it is not known from any other Indians it is most probably a post-Columbian culture loan from the whites.

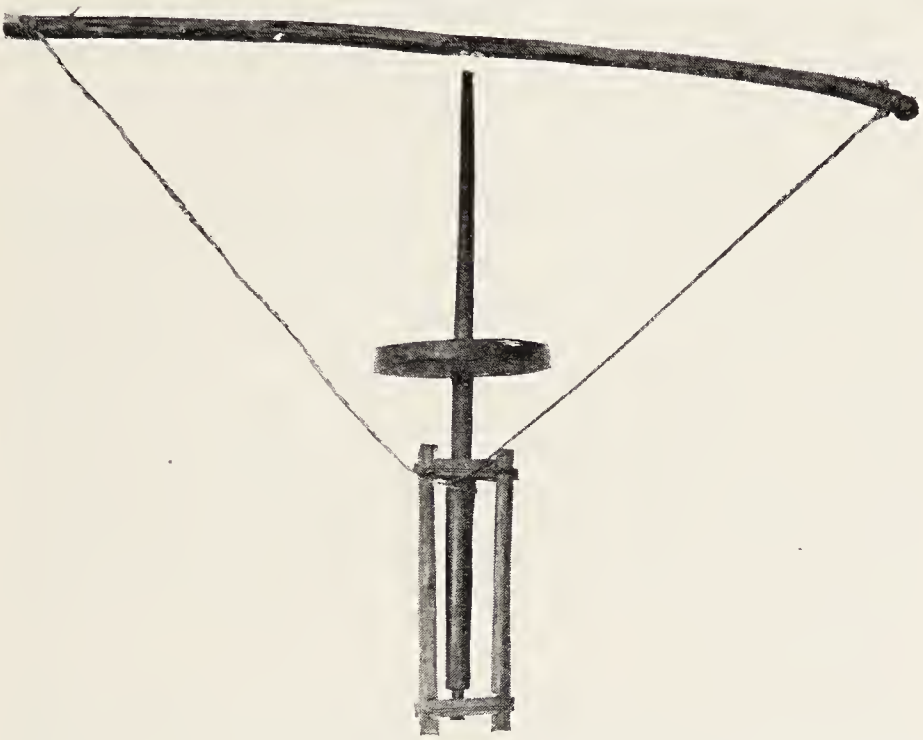


Fig. 53. Rope-spinning apparatus from the Busintana Indians, Colombia. G. M. 16. 3. 49. ($\times^1/_5$.)

A rope-spinning apparatus is known from the Goajiro (89) and the Busintana (90) (fig. 53), From these tribes Bolinder has brought home specimens which are now preserved in the Gothenburg Museum. It is further known from the Ijca and Chimila (91). According to Bolinder, in Spanish it is called "Carrumpa", and in Goajiro, according to Celedon, "Korompa". Seeing that contrivances of this kind are never found among such Indians as have remained untouched

by white influence, we may consider it as certain that only in post-Columbian times have they been introduced by the whites.

From Map 9 (See Appendix 9) we are able to see the American distribution of the pump-drill (fig. 54). This is a post-Columbian culture element, as is evident from the fact that it has never been found among such Indian tribes as are uninfluenced by whites, and further because it is never mentioned in accounts from the era of the Discovery. In our days I never have seen white people in South America use the pump-drill.

Of great theoretical interest is the circumstance of the pump-drill having in at least four cases been borrowed from the whites, viz. by the Pueblo Indians, the Iroquois, the Indians of the North-West Coast of North America, and the Indians in the Isthmus of Panama. Between these Indians no intercourse has taken place in post-Columbian times. It thus provides a typical example of a culture element appreciated by the Indians. I think it even probable that the Cuna and the Chocó have severally borrowed this culture element from the whites, seeing that peaceful intercourse between these two tribes is, and also has been, so very slight.

It is further, as already mentioned, of the very greatest interest that the Indians of California have invented a special form of pump-drill with movable disk. Of interest is also the Pueblo peoples' particular form of pump-drill with stone whorl and flint point.

If we did not happen to know that the Indians have obtained the pump-drill from the whites, but only knew its distribution, we should say that the pump-drill was invented, or had been introduced, in some locality or other and subsequently spread as a loan among the tribes. The distribution of the pump-drill serves as a warning against drawing all too hasty conclusions as to the history of any cultural element on the basis of its distribution. That the

pump-drill was a desirable element is especially easy to understand as drilling holes through stone, mussel-shell beads, hard seeds and teeth forms an important industry to the Indians, although with inadequate tools a very laborious one.

Distillation of sugar-cane juice by the whites is a process that innumerable Indians have witnessed, and to spirits they are much addicted. It is nevertheless only in rare

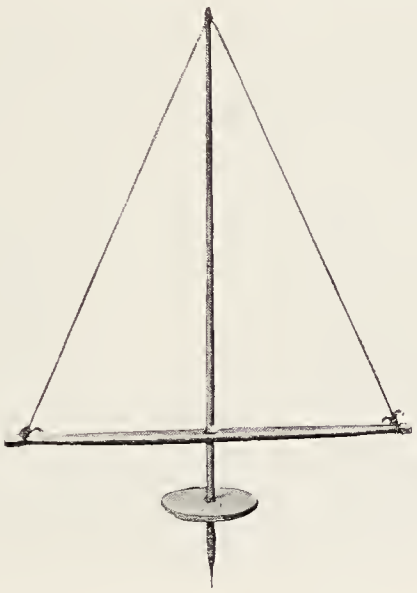


Fig. 54. Pump-drill from the Cuna Indians. G. M. 27. 27. 1346 ($\times^1/_{12}$.)

instances that Indians themselves have imitated the distillation apparatus of the whites. Personally I have only seen such apparatus among the Quichua, and in the literature I know of no reference to it except from the Cayapá (92).

The shape of the huts has in certain quarters been substantially influenced by the whites. When they had obtained better tools than formerly, the Indians very generally discarded the circular hut form for the rectangular.

In 1905, for example, I visited in Peru an Indian tribe, the Yamiaca, who a few years previously had come into

friendly contact with white people. Since then they had altogether changed their ancient type of hut so as to copy the houses of the Peruvian rubber collectors. A similar change in hut architecture I have seen among the Huanyam on Rio Guaporé in Brazil (93). In ancient writings square Indian huts are rarely mentioned except from the Andes, where they were built of stone or sun-dried brick. In comparative ethnographical works I have seen references to rectangular Indian houses, unaccompanied by the slightest attempt at examining whether they were of an original type or not. The circular or oval hut is always of pure Indian type, although certain details about it may have been borrowed from the whites. It cannot be said that the Indians have learnt from the whites to improve their dwellings, only that they have modified them.

The only tribe in America that has learnt from the whites how to smelt iron ore, and how to manufacture implements out of the iron thus recovered, is the Campa Indians in Peru (94). The Campa also know the fire-blowing bellows (fig. 55.).

It has been suggested that it may have been at some mission station that these Indians have learnt iron-working, and that they kept it up after leaving the mission. Whether there is any truth in this has not been thoroughly investigated. It is, however, a fact that in the 1870's, when the smelting furnaces of the Campa were described, they were the only people in Peru, the whites included, who produced iron from the ore. Unfortunately this important industry has never been properly studied by any investigator.

It is probable that in America stringed instruments were not known prior to the Discovery. From that era they are never mentioned from the culture regions of Peru or Mexico. As early as the time of Orellana, however, the Indians of the lower Amazonas — who by then had only been in occasional contact with whites — had learnt to manufacture

a three-stringed musical instrument which very soon fell into disuse (95). The musical bow, which is found among the Araucanians of Patagonia, in El Gran Chaco, in Guiana and in Colombia, the Indians have probably only learnt to use in post-Columbian time. The side-blown flute with six co-ordinated holes, which is widely distributed, appears to be a loan from the whites. And so is the clarinet, which, e. g., is found in El Gran Chaco (96).

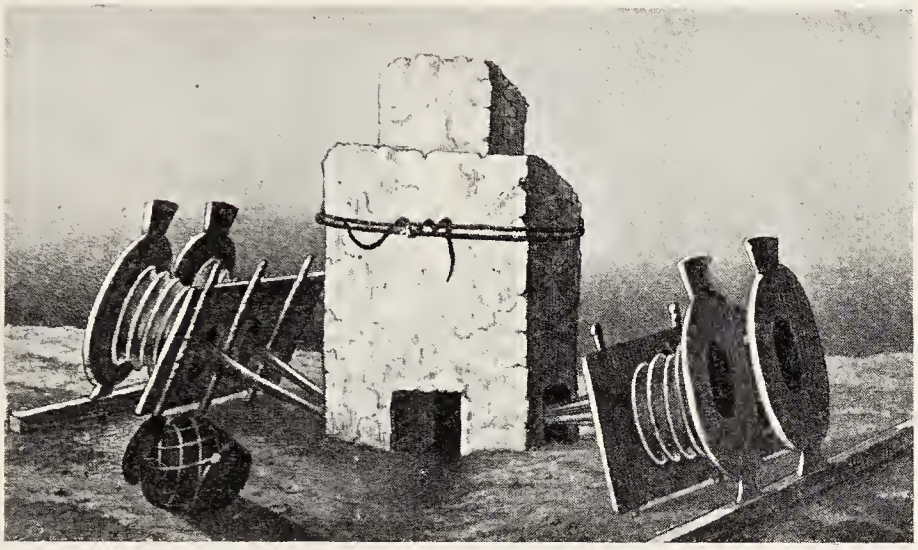


Fig. 55. Iron-smelting with fire-blowing bellows; from the Campa Indians. (After Raimondi.)

Least of all positively influenced in their Material culture by the whites seem to be tribes on a low stage of culture, like the Fuegians.

Even upon the spiritual culture of the Indians the positive influence of the whites has been much less than one would be inclined to think when remembering all the energetic work that innumerable missionaries during centuries have expended upon converting Indians to Christianity.

In cases where missionized Indians have been abandoned by the missionaries, they have before everything else re-

tained the Church festivals. It is stated of the Huanyam Indians on Rio Guaporé in Brazil, who had among them a mission in the early part of the 18th century but who have not been visited by missionaries after the expulsion of the Jesuits in 1767, that they are still celebrating a feast on the day of Sa. Rosa. She was the patron saint of the mission to the Huanyam. At Carnival time the Chiriguano dance with "spirit faces". The Aymara and the Quichua perform their old dances on days of Christian church festivals.

Nimuendajú, who has made a thorough study of Indians in Paraguay whose ancestors during many years were under mission influence, has found that their spiritual world has in a remarkably small degree been affected by Christianity (97).

For my own part I consider that a good many of the folk-tales told by the majority of semi-civilized Indians, in which a smaller but more intelligent animal gets the better of one which is bigger and stronger, are post-Columbian. No attempt at conclusively proving this has however been made.

Now and again very strongly mission-influenced Indians in their myths exchange the ancient culture heroes for Christ, the Virgin Mary, and the Saints (98). It is remarkably seldom that one finds the Cross adopted by the Indians as a magic symbol. The Bogotá Indians in Panama plant crosses at the paths leading to their huts as a protection against evil spirits, whilst the Quichua paint crosses on the faces of rocks where evil spirits have their abode. From the Cuna Indians I have obtained a wooden figure (fig. 56) which contained a tutelary spirit, and on this a cross has been carved. Many of the wooden figures that, at their incantations, the Chocó suspend about their medicine huts are of cruciform shape, but whether this merely constitutes an accidental resemblance, I cannot definitely opine upon.

The Aymara occasionally use European alphabetical letters as ornaments on their fabrics. So far as I have seen they are not arranged into words. These Indians have also in post-Columbian times invented a picture script (fig. 57). It is said to have been composed by an Indian of Sampaya, on Lake Titicaca (99). This picture writing depicts the Commandments, the Sacraments, etc. This Indian was unable to read or write ordinary script. He did not employ our letters or figures, but pure picture-writing which he must entirely have

Fig. 56. Wooden figure from the Cuna Indians. G. M. 27. 27. 1280. (× 1/4)

composed himself. It cannot but be supposed that he received the idea of the whole thing from seeing the white men's script and its use. This genial invention appears to have lived on in that locality for the space of a generation or two and then been forgotten[1]).

[1] In his Völkerkunde (99 a), Pater Schmidt has written an exceedingly interesting chapter on the important part played by highly gifted individuals in primitive society. What progress there be made, is the work of these geniuses. I wish most emphatically to endorse what the author has written in that work. The only thing is that I believe it is oftener than Pater Schmidt thinks that two of these geniuses happen upon the

There is also another influence in historic time on the Indians that we are in a position to verify, which is that of the negroes, and here we shall find that it has not been of any considerable importance although over vast areas the negroes come into intimate contact with the Indians. From the negroes the Indians have borrowed certain musical instru-

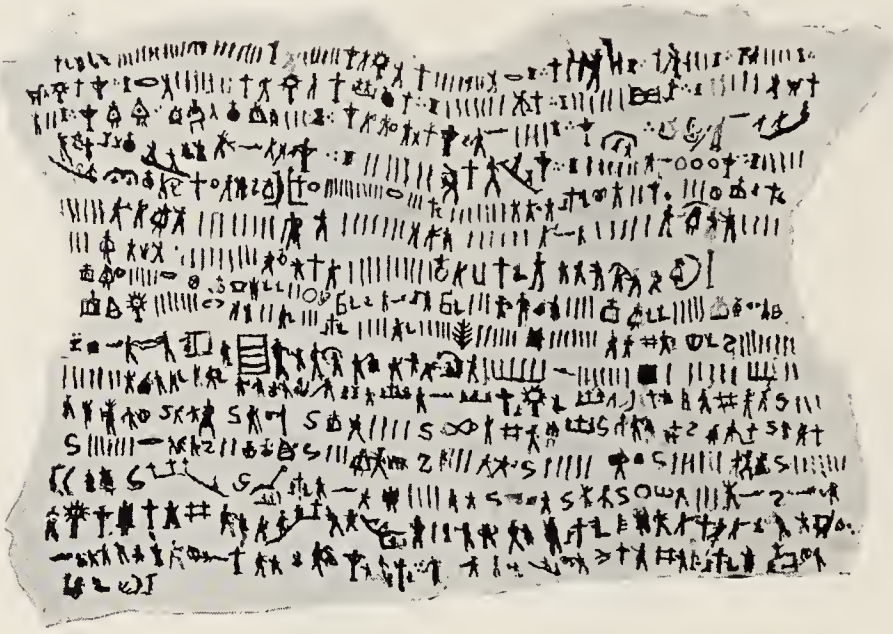


Fig. 57. Picture Writing from the Aymara Indians. (After v. Tschudi.)

ments, such as the *marimba*, and probably drums with wedge-stretched membrane, and the side-blown trumpet (99 b), and further they have from the blacks adopted, cast-nets, spring-hooks and a certain kind of teeth-filing.

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same invention, and this has no doubt taken place more often than would appear from the history of human culture, for, as I have already pointed out, it is one thing for an invention to be made, and another that it actually is taken up and made use of. One invention of this kind, viz. the script, here referred to, among the Aymara, within a short period fell into disuse and disappeared, for the reason that the tribesmen did not understand it or thought they had no use for it.

Cast-nets occur, e. g., among the Chocó and Cayapá (100). Conzemius (101) considers the cast-net a modern element among the Rama on the Mosquito coast. By no Indian tribe unaffected by the culture of whites or negroes is the cast-net known. Evidently it is a culture element which has been introduced in post-Columbian times, probably by the negroes.

Drums with wedge-stretched membrane, "Keilspannung", are in use among the Chocó Indians. They are also mentioned by Barrett from the Cayapá (fig. 58) (102). The marimba, which is common in Central America, is in South America also known from the Cayapá (103) and by Rivet (103 b) from the Colorado Indians. It is undoubtedly a culture element introduced into America by the negroes.

Fig. 58. Drum with wedge-streched membrane. Cayapá Indians. (After Barrett.)

In Guiana and on the Rio Purus are found a kind of exceedingly ingenious traps which are arranged in such a way that the fish, when it touches the bait, not only gets caught but also jerked up above the water on account of the trapping apparatus being connected with a springe which when released lifts the snare and the fish out of the water (104). Here we probably see an African idea transplanted into America by negro slaves, and subsequently somewhat modified by the Indians.

Teeth-filing is a custom which in America is both pre-Columbian and introduced by negroes. Filing the front teeth to a point is thus a custom that certain Indians in Guiana as well as Bolivia have learnt from the negroes (105, 106).

For the rest, negro influence is remarkably slight. Thus the negroes have in no appreciable degree whatever influenced any Indian handicraft. It is possible that the Indians have learnt quite a number of folk-tales from the negroes, but this is a subject which has not been exhaustively studied.

What is especially typical of European as well as of African influence is that it has seldom resulted in the Indians having exchanged anything old for something new. With the exception of the introduction of certain cultivated plants and domestic animals, such influence has carried with it no positive changes in the life of the Indians that are of any importance whatever, excepting of course that the introduction of iron tools have been of great importance. But all the rest that I have here mentioned as being culture loans from the whites is fairly insignificant in the Indians' struggle for existence.

From the whites or from the negroes the Indians have borrowed a number of culture elements which are pre-Columbian in America but not in the region where they are living; thus the Indians of Guiana have in this way become acquainted with the skin drum (107), the Carajá with the eyed needle (108), certain Amazonas Indians with the wooden spoon — all of them culture elements which are pre-Columbian in western South America. The skin drum was known in western South America, Central America, and over a large portion of North America in pre-Columbian times (109). In Guiana as well as in many other regions the Indians have only in post-Columbian times learnt from the whites the use of skin drums, which they call "tambora", "zambora", etc.

It is very strange, we must admit, that culture elements like the eyed needle, the wooden spoon, the skin drum, etc., which certain Indians readily accepted from the whites, did not spread to them before, when we know that they were known in America in pre-Columbian times. This circumstance proves that culture elements spread very slowly when not assisted by migration, and it is probable that no important migrations have for a very long time taken place from the western portion of South America to the eastern. Linguistically, at any rate, there is no evidence of any.

In a similar way it should also be conceivable that any

given pre-Columbian culture element in America may not necessarily derive from one and the same origin. It may in certain parts of America have been independently invented, whilst in others it may have been introduced from the Old World.

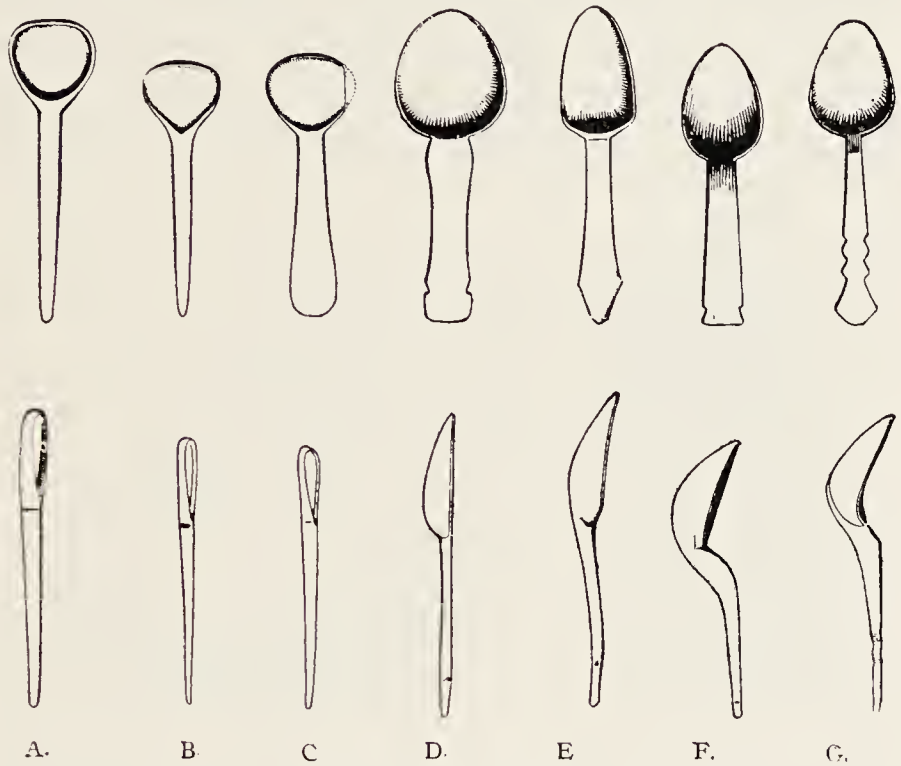

Fig. 59 A. Wooden spoon. Ashluslay R. M. A. 215 1/6
B. » » » » » » 212 »
C. » » » G. M. C. 100 »
D. » » Tapiete R. M. L1 6 »
E. » » Mataco » » M. 382 »
F. » » Chané » » P. 97 »
G. » » Mataco » » M. 1061 »

Through white influence the Indians in some instances, though very rarely, have altered the form of their native implements. An interesting example of this I have adduced in Part I of this Series from the Chaco where I have shown how several Indian tribes from white influence have changed the shape of their wooden spoons, so as to make them resemble

European spoons with a curved handle. I here reproduce the picture appearing in Part I showing the shapes of different Indian spoons in those parts (fig. 59). The spoons of pure Indian type with a straight handle, which are found in the interior of the Chaco, are exactly like those which are recovered from pre-Columbian graves in Puna de Jujuy in northern Argentina and on the Peruvian coast. Thus we see that for a space of 400 years these spoons have not changed in form. Only with the advent of the whites was introduced a new form of spoon which now is becoming predominant.

It is quite astonishing how few the Indian clay vessels are that constitute imitations of the multitude of porcelaine, metal or glass vessels of different kinds that the Indians have seen. Manufacturing vessels with a lip, like our cream jugs, the Chiriguano and the Quichua, among others. have learnt from the whites. The Goajiro have barrel-shaped vessels, and vessels which in their form imitate stone-bottles from Curaçao (fig. 60 b). A characteristic trait in these vessels, which are imitations of something that the Indians have borrowed from the whites, is that they only occur by single specimens and that they evidently are not popular. In many cases they have probable been manufactured for sale to the whites. Among the clay vessels of the Chocó (fig. 66), so highly varied as to form, I have not seen a single one that has the appearance of being an imitation of any vessel obtained from the whites, and yet these Indians have for centuries been in contact with whites, and to this day they occasionally manufacture clay vessels for the whites and the negroes.

Bartering with the Indians provides excellent opportunities for studying what demand there may be for novel culture elements, as well as the greater or less conservatism of the Indians. So for example Eder, the Jesuit, states of the Indians in Mojos that they exclusively wanted blue glass beads. This may probably be accounted for by the resemblance borne by such beads to turquoises, an article that for-

merly they experienced much difficulty in obtaining. When the Chiriguano mount glass beads in their *tembetas* they exclusively use such as resemble the blue or green stones they formerly employed for that purpose. The conservatism of the Indians as regards the colour, and even the size, of glass beads is well known to every trader in these commodities.

Cloth-stuffs I have always found to be much in demand. As a rule hard-wearing qualities are sought for. As to colours, red and blue have generally been most popular.

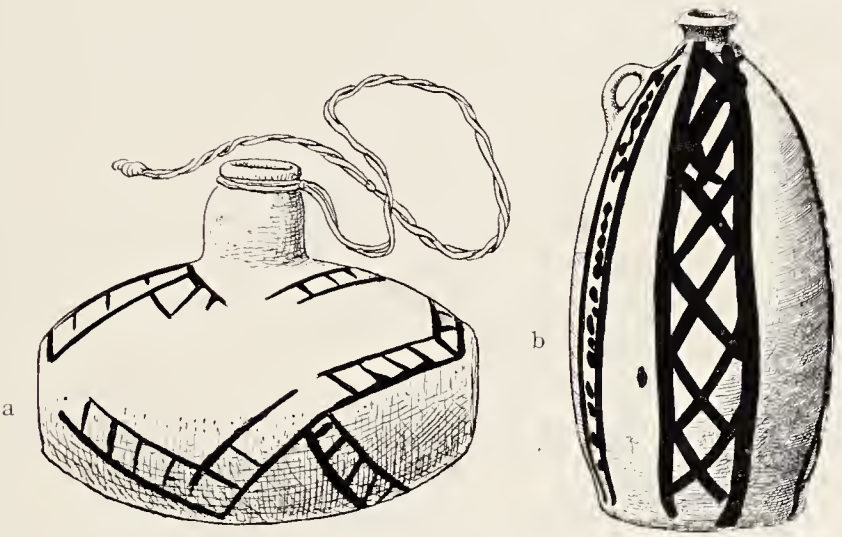

Fig. 60 a. Barrel-shaped vessel G. M. 24. 2. 605. ($\times 1/3$)
b. Vessel of a shape imitating a stone bottle from Curaçao. G. M. 24. 2. 609. ($\times 2/9$) Goajiro Indians.

Not much interest has been shown in the alien ornamentation schemes, and it has even been my experience that, e. g. among the Chimané, I have not succeeded in bartering away cloths of gaudy flower patterns whilst one-coloured stuffs have readily been accepted. Another characteristic point, which I have already mentioned — and one which I consider very important — is that this alien ornamentation never, or at any rate exceedingly rarely, is copied on the Indians' own belongings. It is therefore only logical that the tribes should observe towards each other a conservative attitude in some

degree approaching their superciliousness towards things alien. In consequence may be seen tribes adjoining each other, such as the Chané and the Mataco, whose ornamentation is greatly different. When we see that the Mataco refrain from copying the ornamentation of the Chané it cannot be put down to ignorance but to its being to them something new and foreign.

Most Indians obtain by bartering trade with the whites both cloth and ready-made clothes. Apart from the Quichua and the Aymara, I have never seen any Bolivian tribe cutting out cloth and "tailoring" for themselves trousers or shirts like those they obtain from the whites. I have never seen an Indian try to make a button. This is an invention in which the Indians do not take the slightest interest, and yet it is well known to countless Indians.

The whites have contributed to the spread of certain purely Indian culture elements to tribes who did not previously possess them. The missionaries have introduced the long shirt among certain tribes of the western Andes where it was not known before. From all that can be ascertained, the Indians of the upper Amazonas had at the time of the Discovery already invented mosquito nets (110). Purely Indian mosquito nets of a shape different from those used by the whites are still used by the Yuracáre and Guató. This article was not used by the Spaniards at the time when they conquered South America, but only gradually came into general use among them after they had learnt from the Indians to employ it, and subsequently many Indian tribes borrowed from the whites this means of protecting themselves against mosquitoes. It was only when the whites introduced very cheap cotton-fabrics from Europe that the mosquito net began to come into general use among mestizos and Indians influenced by civilization.

"Profane" smoking of tobacco is a practice that, judging from everything, the whites have contributed in spreading. Tobacco-smoking was at the time of the Discovery not nearly so general among the Indians as nowadays, and was then

universally put to magical uses, which probably tended to restrict its spreading (111). I have myself been among Indians, e. g. the Chacobo, who do not know how to use tobacco for smoking (112). Max Schmidt (113) mentions a tribe of non-smokers, viz. the Umotína of Matto Grosso. The majority of the Aymara and the Quichua have not yet taken up smoking on account of their being chewers of coca. With them, one vice eliminates another. The tobacco-pipe, as we know, is an Indian invention. All over the world the Indian pipes have been copied, and their form modified according to local taste. Such pipes of "European" form have subsequently been imported into America, and there copied by the Indians, cf. e. g. the pipes of the Motilones, (113 b) certain pipes of the Carajá (114), etc. The cultivation of non-poisonous manioc has been spread through the whites to tribes that previously only knew the poisonous variety. Cacao-cultivation has been spread over parts of South America by the whites, although the Indians have not learnt how to drink cocoa, as in Central America this plant is principally used in ceremonies and incantations. The Chimané, for instance, cultivate cacao for sale but hardly for their own use. As to the Indian feminine garment called "tipoy" — used, e. g., among the Chiriguano — it is probably through mission influence that it has been lengthened upwards. The double-bladed paddle, which in South America is a pre-Columbian and very rare culture element (115), has by Thulin been found among civilized Indians on the coast of Guiana. Such paddles not being known from Indians less influenced by civilization in this part of South America, nor being referred to in early accounts of travel, it may be assumed that they, in Guiana, are post-Columbian. Among certain tribes there is reason for suspecting that a very ancient American culture element, the harpoon, of being post-Columbian. The Chocó, for example, call the harpoon "harpóna", and, so far as may be judged, they have borrowed it from the negroes, who are experts at handling this fishing accessory.

The examples here given go to show that is it not by mere hap-hazard that a culture element is borrowed or not, but that certain culture elements are generally sought for as soon as a people has reached a certain cultural stage. That chance circumstances also occasionally come into play to a considerable extent is only natural.

We may think it strange that these culture elements had not spread over the entire continent, or the greater part of it, already prior to the Discovery, especially when we consider the way the banana in a few years attained such a wide distribution.

The reasons for this are various. The mosquito net, for example, is of course an exceedingly desirable article in swamp regions, but that it nevertheless only spread to such a limited extent is due, as I have said, to the difficulty the Indians experienced in obtaining fabrics suitable for nets of this kind.

The study of Indian culture after the Discovery provides us, as we have seen, with quite a number of concrete examples of the way culture elements are borrowed and spread about.

To begin with, there are the cultivated plants and domestic animals, about whom we shall find that they have spread with extreme rapidity and almost independently of migrations and such like. The banana has spread to practically all tribes where its cultivation is possible, with the exception of those living on upper Rio Xingú (116). In a similar manner fowls spread most rapidly. The same applies to the horse, although its distribution was limited to open country. No non-agricultural tribe became agricultural from adopting the new culture plants, but on the other hand many tribes of hunters or gleaners became rearers of cattle. Compared to plants and domestic animals, the remainder of the culture elements borrowed from the whites have spread very little. They have not with equal facility been capable of passing from tribe to tribe, the only ones that can be said to have done so are the pellet-

bow, the cotton-bow and the side-blown trumpet. The wide distribution of the firstmentioned is probably connected with the migrations of the Guarani Indians.

The greater part of the culture elements that the Indians have borrowed from whites and negroes has been adopted by the men. It has always principally been the men that have got into touch with the strangers and then learnt from them.

It may well be accepted as probable that the culture of the men as a rule has proved more receptive to new impressions than that of the women. It may be presumed that in Indian society the conservative element is very largely represented by its women.

Examples of culture elements other than cultivated plants and domestic animals, borrowed by the Indians from the whites.

	Manufactured by		Used by	
	Men	Women	Men	Women
Pump-drill	+	—	+	—
Tanning with bark	+	—	+	—
Double-headed eagle and other ornaments	—	+	+	+
Biblical ornaments, (Payaguá)	+	—	+	—
Clay vessels (Cocama), plant ornaments	—	+	—	+
» » (Caduvei) » »	—	+	—	+
Cotton-bow	+	—	—	+
Flute with six carefully coordinated holes	+	—	+	—
Crochet needle	?	?	+	+
Hat plaited of palm leaves	+	—	+	—
Rope-twining apparatus	+	—	+	+
Stringed musical instruments	+	—	+	—
Clarinets	+	—	+	—
Appliqué technique	+	+	—	+
Iron-smelting	+	—	+	+
Picture-writing (Aymara)	+	—	+	+
Iron-pointed arrows	+	—	+	—
Pellet-bow	+	—	+	—
Rectangular houses (superseding round ones)	+	—	+	+

Examples of culture elements borrowed by the Indians from the negroes.

	Manufactured by		Used by	
	Men	Women	Men	Women
Marimba	+	—	+	—
Drums with "Keilspannung" (wedge-stretched membrane)	+	—	+	—
Side-blown trumpet	+	—	+	—
Cast-net	+	—	+	—
Spring-hook	+	—	+	—
Teeth-filing	—	—	+	

Everywhere in South America immense changes have naturally taken place as a result of the destructive influence of the whites, and it is very late for us now to attempt studying Indian culture, though not quite so late as some few scientists may perhaps imagine. A large number of Indian tribes have, since the era of the Discovery, died out or become decultured, but many have nevertheless retained much of their culture, and it is an open question as to whether we are not able, partly by studying these surviving tribes and partly through study of the early literature, to reconstruct a very fair picture of Indian culture such as it was at the time when America was discovered. It does not matter so very greatly if tribe A. has become decultured when there remains another tribe, B., among whom A's culture lives on, or when a similarly cultured tribe is found described in detail. In a general way it may be said that the deculturing influence of the whites has progressed most rapidly in regions where plants introduced from the Old World could successfully be cultivated, and where it was possible to rear domestic animals similarly imported.

In this connection it is of a certain interest to note such culture elements as are mentioned in the early literature,

but now extinct after 400 years of contact with the whites. We shall find that the extinct culture elements have principally occurred in western and southern South America. As regards the culture area in the west we are, by means of archaeological research, in a position to supplement our knowledge of such elements under exceptionally favourable conditions. In the south of South America, on the other hand, not a few culture elements may be surmised as having become extinct in post-Columbian time without leaving us any possibility of ever obtaining any knowledge of them.

Whilst the whites are entirely to blame for the annihilation of Indian culture, and the extinction of many culture elements, in the western parts, in the southern portion of South America it may be accepted that many extinct elements had become rare already at the time of the Discovery. Métraux (117), who has made a close study of the culture of the Tupinambá Indians — a tribe now extinct, or departed from their original region of habitation — has in that culture, with the exception of pemmican and the feather mantle, not discovered a single culture element now extinct in South America. Certain culture elements which occurred among the Tupinambá are now very rare, as e.g. palisades and shields, but are, however, still to be found among one or two tribes.

In a similar way very few culture elements have altogether vanished from the Amazonas region.

It must not be supposed that so very many Indian culture elements have become extinct by reason of the whites having introduced better things in the same line. This may properly only be said of tools made of bronze, copper or stone. Bronze and copper are so inferior to steel as material for tools that, naturally, the imported steel implements in very short time supplanted the former. The tools that were made of bronze or copper in no instance appear to have been copied in iron, or else it might have been expect-

ed that at any rate such a universally used tool as the Tumi knife would have survived in the form of an iron tool, like its analogy, the ulo, among the Eskimo. Neither has the T-shaped axe-head been copied in iron. This might quite easily have been done by the Spaniards if the Indians had wanted it, as from reasons of profit the former aimed at meeting Indian taste in other directions. When the Indians of western South America passed from stone age to copper, and from copper to bronze, they copied their old tool types as far as possible into the new material. The mirrors made of pyrite and obsidian disappeared because they were supplanted by something better.

The great number of culture elements in western South America that also ceased to be manufactured and used mainly consisted of those which were connected with the culture of the Incan realm and became superfluous after that kingdom had been overthrown as an independent state with its own warriors, chieftains and temples. Most of these culture elements became extinct as early as the 16th century.

	Culture elements now extinct in South America	Culture elements now extremely rare but at the time of the Discovery widely distributed in South America
Buildings		
Steam bath-houses	+ (118)	
Stone-built forts	+	
Large temples, and such like	+	
Palisades	—	+ (119)
Plank-built houses	+	—
House-fittings and furnishings		
Cultivated plants and agriculture.		
Digging-stick with lateral projection for the foot	+ (120)	—
Domestic animals		
Certain native breeds of dogs	+ (121)	—

	Culture elements now extinct in South America	Culture elements now extremely rare but at the time of the Discovery widely distributed in South America
Weapons for the chase and for war		
Three-feathered arrows	+ (122)	—
Stone-headed clubs	+	—
Plate armour	+ (123)	—
Quilted cuirasses	+ (124)	—
Rectangular shields	—	+ (125)
Stone-pointed spears	+	—
Stone-pointed arrows	+	—
Helmets	+	—
Fishing gear		
Tools		
T-shaped stone axes	—	+ (126)
Utensils for preparing food		
Narcotics		
Saltmaking		
Pumping apparatus	+ (127)	—
Dress and ornaments		
Purple dyes	+	—
Teeth with incrustations of metal	+ (128)	—
Works in stone-mosaic	—	+ (128 b)
Feather mantle		
Navigation		
Double-bladed paddle	+ (129)	—
Rafts of inflated animal skins	+ (130)	—
Games and toys		
Ring-and-pin game	+ (131)	—

	Culture elements now extinct in South America	Culture elements now extremely rare but at the time of the Discovery widely distributed in South America
Emblems of rank		
Feather parasol	—	+ (132)
Litter, for carrying	+	—
Miscellaneous		
Mirrors of pyrite or obsidian	+ (133)	—
Stone-headed digging-sticks	+ (134)	—
Finger-mutilation, in mourning	+ (135)	—
Trepanning	—	+ (136)
Bee-hives of baked clay	+ (137)	—
Rock-carvings	+	—
Rock-paintings	—	+ (138)
Musical instruments		
Handicrafts		
Tools, and the like, of brouze or copper	+	—
Weaving technique, finest quality	+ (139)	—
Tapestry-weaving technique	—	+ (140)
Huaira	+ (141)	—
Various forms of clay vessels	+	—
Tripod ceramics	—	+ (142)
Clay vessels shaped in a mould	+	—
Stone implements of superior workmanship	+	—
Stone-piercing	—	+ (143)
Gold-work, all kinds except hammered out.	+	—
Funeral customs		
Mummification	+	—
Deep-level graves	+	—
Secondary urn-burial	—	+ (144)

We may safely suppose that many culture elements had already become extinct ere white people first set foot upon American ground, a supposition that should be verifiable

by archaeological evidence. It is surprising, however, that there exists no really important culture element among those which have been recovered by archaeological excavations in Peru, that has not been mentioned from the era of the Conquest, with the one exception of certain kinds of weaving technique. East of the Andes not much archaeological research has been done so far, but from the southern part of S. America sundry things may be pointed to that are neither known from Indians now living nor from relevant literature right back to the Discovery. South American archaeology is consequently poor in "implements of problematic use", and all talk of keeping apart archaeological and ethnographical studies in that continent is pure nonsense.

Examples of culture elements only known in South America from archaeological excavations are the following:

The Patagonian axe of enormous size (145).
Stone axe, pierced for lashing to the handle (146).
Clay vessels with hollow rim (147).
Trumpets with curved tube (148).
Various kinds of copper and bronze ornaments (149).
Certain types of copper or bronze implements (150).
Clapper bells (151).
"Llama harness hooks" of special type. (152).
"Saws" made of stone (153).
Rectangular stone knives (154).
Tanga of baked clay. (155).

In this connection I wish to point out that nowadays objects entirely unknown to science are seldom discovered in South America. That much advanced is our knowledge of the South American Indians. A collection like, e.g., the one brought together from the Jivaro Indians by Karsten, and now in the Gothenburg Museum, contains nothing new that has not already been described by Rivet (156). This does not prevent that Karsten has made important observations as to the uses of the objects in question.

In the foregoing I have dealt with the whites' and the negroes' positive influence upon Indian culture. It will have been seen how easily were spread such cultivated plants and domestic animals as were in demand. It will also have become evident that when it comes to tools, implements, weapons, ornaments etc., the Indians are very conservative. Nor do culture elements of the latter categories spread as readily as new culture plants and new domestic animals.

CHAPTER VIII.

Modifications of Indian culture connected with migration by tribes from one region into another.

Beside the influence from whites and negroes upon Indian culture, and the Indians' loans from those immigrants, of which I have just spoken, in America we possess yet another, historical, means of studying the importance of migrations as spreaders and modifiers of culture. I refer to the post-Columbian Indian migrations, of which by far the most momentous were those of the Guarani Indians. Even the migrations of the Caribs were extensively continued after the discovery of America. The latter, however, have not been thoroughly studied. These wanderings appear, among other things, to have contributed to the spread of curare, which is nowadays more widely distributed than at the time of the Discovery (157).

The migrations of the Guarani tribes have been studied by the author and, in later years, above all by A. Métraux (158). One of the most important results of Métraux's comparative studies of the material culture of the Guarani to me seems to be that these peoples, who nevertheless represent the last large-scale migrations over the South American continent, have so few culture elements in common. Thus there is no possibility to speak of such a thing as Guarani culture, as an entity. It is quite evident that when a Guarani tribe has moved from one region into another, its culture has undergone very considerable modi-

fication under influence from the local culture, as I have shown (159) to be the case with those Chiriguano who in the early part of the 16th century took possession of the Chané country on the border between the Andes and the Chaco. They have partly adopted the culture of the Chané, while at the same time forcing their own language upon the latter. For the rest, their influence on the cultures of neighbouring tribes has been but slight, with the exception of the Tapiete who have become Guaranified, i.e. nowadays are Guarani-speaking.

In the same way the Guarani Indians that in the 16th century emigrated from Paraguay to the north-eastern part of Bolivia (160) have exercised very little influence, if any at all, on the tribes they there found, whilst having themselves learnt, in the new territory, much that was new to them. Thus a proportion, though not all, of these Indians have given up Bakaïrí-spinning in favour of Bororó-spinning (161); they use bark-cloth, and employ a type of carrying-basket differing from that used by their kinsmen in Paraguay; formerly, though now no longer, they used to pierce the septum of the nose; they have adopted the pan-pipe, a new type of bow, and so on.

For themselves they have retained from the time when they were settled in Paraguay the same method of fastening and cutting out their arrow-feathers, their wooden mortar, tipoy, etc. None of these things have been passed on by them to their neighbours.

From what I have here said of the migrations of the Chiriguano and Guarayú, and the consequent modification of their culture, it may be inferred that a people who, immigrates into a new region already occupied by tribes on a similar stage of culture, in a high degree accommodates itself to local prevalent conditions by adopting the culture of the original inhabitants. It is only when the immigrated people occupies an entirely different cultural level to those already established that the former is able to preserve

its distinctive cultural character, and in such a case we should on the face of it be able to ascertain that a foreign element is present.

If it may be supposed that a small tribe has come over from Oceania to America, and there come into contact with people of roughly the same cultural level, such immigrants ought to have fared similarly. Very rapidly they may be supposed to have become Indianized as regards their culture, as otherwise the Oceanic culture would have formed an enclave within the Indian culture, and, as we definitely know, no such thing is in existence.

It would be of very great importance to know exactly the manner in which a migration is carried out when it is a question of Indians. Are we to imagine that a people who has started on a migration moves over vast distances in a brief space of time, or that all moves are undertaken by gradual stages? Of very great assistance would be to possess some measure of actual knowledge as to whether any Indian tribe has been able to change its location from one side of the continent to the other. To judge from what we know of such Guarani migrations as are a matter of history, i.e. those having taken place in post-Columbian times, a tribe is able to move a great distance in a few years' time. Thus in ten years, 1539—1549, a section of the Guarani tribe moved from the Brazilian coast to Peru, and up the rivers at that. In the same way other Guarani tribes moved in a few years over very considerable distances (162). A coastwise migration, e.g., along the North American coast down to the west coast of South America, may perhaps also have taken only a few years, or perhaps decades, especially as the migrating people always set as their goal the finding of some country where natural conditions resembled those they were used to of old.

This means that their culture would not necessarily have received any impression from the physical conditions of the regions traversed. In rapidly passing through a tropical

region, such culture elements as are not pertaining to a tropical climate need not get lost.

Where the regions traversed were uninhabited, migration could be carried out without any fighting. If inhabited, the passing through may perhaps on precisely that account have had to be hurried on. The wanderers would have been obliged to hasten on towards unoccupied country.

A theory like the one I have set forth in the above would go towards explaining the many points of resemblance that exist between Indian culture in the extreme south of South America and in North America, as I shall point out further on. According to tradition, the Aztecs had emigrated from Mexico into Nicaragua. The distance by sea is ca. 350 leguas (163).

Even an immigration into South America from Asia may perhaps have taken much shorter time than is generally supposed. A people having come into America via Bering Strait is by no means bound to have stopped, first some time in Alaska, then again on the north-west coast, and so on. It is not entirely out of question that it may have, in the space of a few years, covered the distance all the way from Asia to far down in South America. Having only had to follow the coast, and if it has not, like the Guarani Indians, been in quest of "the land where no one needs to die", it may perhaps only have been looking for a place where food was abundant.

If we are to conceive as possible some cultural connection between the Indian culture of tropical America and, e.g., the Indonesian culture, that is not based upon intercourse with Oceania, then we must accept the possibility of extremely extensive migrations of the kind indicated, and completed within an extremely brief space of time, in fact so brief that such common culture elements as are only suited to the tropics have not sunk into oblivion ere the conditions warranting their use have again presented themselves.

When a tribe has emigrated to some uninhabited region it has no doubt modified its culture in a much less degree than has been done when the immigrants settled among people who already had in a high degree accommodated themselves to their environs. In the latter case it is obviously the people with the earlier accommodation to local conditions, and not the newcomers, who will predominate in conferring culture loans.

One of the most extraordinary instances of migration found in the whole of America is the Arawaks' ascending the Andes and settling around Lake Titicaca, as linguistically proved by de Créqui de Montfort and Rivet (164). Unfortunately the culture of the Uro Indians has not been sufficiently studied for definitely ascertaining whether they have retained anything of their original Amazon culture in their present location on the high-plateau where nowadays they are living in most respects after the manner of the Aymara Indians.

We cannot point to any culture elements that are characteristic of all the Arawak tribes. It should also be remembered that there is more similarity between Carib and Arawak culture in, e.g., Guiana than between Carib culture in Guiana and Carib culture on Rio Xingú or in Sierra Perijá.

Through migrations culture elements are far more quickly disseminated over wide regions than through culture loans from tribe to tribe, although in consequence of the migration much of the culture of the migrants gets lost if in their new home they settle among people on a similar cultural stage who have already accommodated themselves to local conditions.

Europeans who have immigrated into America have, even they, to some extent been influenced by Indian culture, and yet it should be borne in mind that the European colonists, even in the most remote regions, have remained in touch with Europe, whence they have drawn supplies

of ready-made goods. In the primeval forests of Bolivia and Brazil the agricultural standard of the poorer whites closely resembles that of the Indians. Their dwellings are built of the same material and provided with earthen floors; no nails are used, but everything is tied together in the Indian fashion; the bedstead is in the form of the Indian hammock, the fire-place is on the bare ground, the carrying-basket is of the Indian type, fishing is done with fish poison in the Indian way, their canoes consist of hollowed tree trunks, and so on. In these parts it is actually the Indians who, having well accommodated themselves to the environs, have had more to teach the white aliens than vice versa.

Thus within any given area there gradually comes into being a certain culture which partly has its roots in culture elements imported from outside, and partly must constitute adaptations to local conditions. If a people immigrates into an area of this description, it will assume a culture which will be a blend of their old culture and that of the tribe or tribes already accommodated to the environs.

Acculturation may thus take place not only from exchange of ideas between peoples who are neighbours and thereby gradually acquire a similar kind of culture, but also from a people first having settled in an area where it has thoroughly adapted itself to the environment, then by an alien people having immigrated, whose culture was less suited to local conditions, and so the latter people have been greatly influenced by those better accommodated to the peculiarities of the country. Those who first settled there knew, e.g., what kinds of wood were the best for making bows, the best method of making baskets, and so on. This is what, as I have already mentioned, happened to the Chiriguano when they settled in the territory of the Chané Indians. That is why they have changed the type of their bows, discarded the carrying-basket for the carrying-net, and so forth. This explains why the Guarani as a people do not possess a homogeneous culture, but instead a culture

chiefly resembling that of their neighbours in the country of immigration, whether these regions be the Chaco, Mojos, Rio Madeira, Rio Xingú, or Guiana. Possibly the Chané once adopted their culture from some other, even more early, people within the same region. Peoples may flourish, and in time pass away, but for a given area there will persist a culture which, within certain limits, is much the same.

When the Chiriguano emigrated to Chané Indian territory they adopted to a large extent the culture of the original inhabitants. They have not in the same degree borrowed from the Mataco Indians and other Chaco peoples with whom they got into intimate contact in their new habitations.

This may be accounted for by the circumstance that the divergence between the cultures of the Mataco and the Chiriguano is correspondingly greater than between those of the Chané and the Chiriguano. The Mataco, on the other hand, have profited to some extent, which is due to the Chiriguano and the Mataco not occupying the same cultural horizon, as Thurnwald (165) expresses it.

In an acculturation area like, e.g., the Chaco it stands to reason that the Choroti, Lengua, Ashluslay, Mataco, Toba, Tapieté, and others, whose present-day cultures are fairly similar, did not immigrate at the same time, but it may be supposed that these tribes only by succeeding stages took possession of this vast region, since when several re-adjustments have taken place as regards the areas occupied by these tribes. Brinton (166) is of the opinion that it is the tribes belonging to the Mataco culture that represent the earlier population in the Chaco. It is not inconceivable that he may be right. In such case it would therefore have been these Indians that were the first to accommodate themselves to the local conditions, the remaining tribes subsequently having in part borrowed their culture from them.

CHAPTER IX.

Spread of elements through intertribal borrowing.

Actual data show that different kinds of culture elements have spread very differently. We know that banana-cultivation and the domestic fowl spread with extreme rapidity over the greater part of the South American continent during the 16th century, but not equally swift was the dissemination of implements, ornaments, weapons, etc., for if it had been, the various tribes of South American Indians would by now be possessed of a far more uniform culture than is the case.[1])

If we study Andean high-culture influence in regions east of the Andes we shall find that it was very considerable in northern Argentina, fairly so in El Gran Chaco, only slight in north-eastern Bolivia, and of somewhat more importance in the upper Amazonas. North of Argentina, however, we know of no eastward migration of Quichua or Aymara Indians.

In the lastmentioned region the Indians, judging by everything, were directly influenced by the Andean high culture, at any rate during the later period of the Incan era. Besides, all Andean influence may be supposed to have been

[1]) The following assertion made by Wallis (167) is therefore only partly correct:

"Indeed a new invention or a new idea tends to spread as truly as an outerop of measles. It goes from man to man, from group to group, from culture area to culture area — witness the spread of tobaeeo. It is obvious that while a trait is spreading, its greatest age is synonymous with its greatest distribution."

in the character of a "pénétration pacifique". It is not that Andean peoples have penetrated eastward, but that a greater or smaller number of culture elements were borrowed by peoples living east of the Andes, from their neighbours in the west.

On account of its physical character the Chaco was more accessible to influence from the west than were the forest regions situated farther north.

The remarkable point about this matter does not to me appear to be the fact that the Indians east of the Andes borrowed ideas from the culture area in the west. What on the contrary is remarkable is that they did not borrow more than they did, seeing that the Andean Indians occupied a cultural stage so vastly superior to that of the tribes east of the Andes, and yet the former culture must have been very ancient. It is obvious that also in this case Indian conservatism strongly prevailed.

So wide-spread a custom in the Inca kingdom as deformation of the skull was among the forest tribes only adopted by one tribe in Mojos, (168) one or two on Rio Ucayali (169), and the Omagua on Rio Solimoes (170). Clay-vessel forms were only copied by the Indians of El Gran Chaco and their neighbours. These are the only ones that adopted games of hazard, tapestry-weaving technique, the Peruvian loom, the knuckle-duster, certain musical instruments (171), etc.

The narrowness of the geographical distribution of the influence of the Andean culture in districts east of the Andes — despite this culture having existed for centuries, or perhaps even thousands of years — goes to prove that cultural influence unconnected with migration only makes very tardy progress.

A natural reason why a culture element does not pass from one tribe to another is that the latter has no need of it because of already possessing something that adequately fulfils the same purpose. It may appear strange, e. g.,

that the Chaco Indians, the Choroti and others, have not learnt from their neighbours how to make baskets, but the explanation is simply that, for the purposes to which they might use baskets, they already possessed carrying-nets of various kinds. It may be supposed that a tribe is more likely to adopt some entirely novel idea than to exchange any old and well-tried notion for something else.

As an illustration of this, between the Indians of the western culture area and Amazonas there existed, generally speaking, remarkable divergencies in their material cultures, as will be apparent from the subjoined few examples.

In the Inca kingdom:	In Amazonas:
Net, or shawl, for carrying	Carrying-basket (172)
Handmill, for grinding maïze (174)	Wooden mortar (173)
"Catre" and earth-built bedstead (175)	Hammock (176)
Spade (177)	Digging-stick
Shawl for carrying babies (178)	Baby-sling, of "tipoy" type. (179)
Peruvian loom (180)	Arawakian loom (181)
In pottery-making the clay is mixed with sand or ground potsherds (182)	In pottery-making the clay is generally mixed with ash of tree-bark or sponge spicules. (183.)

We should also bear in mind that no culture element is borrowed by one tribe from another if unsuited to the environments of the potential borrower. Under such conditions culture elements can only be spread through migration, and then only for a time.

It is, besides, to be noted there are many things that a non-settled tribe hardly finds it expedient to copy unless, or until, it becomes itself settled.

Trading intercourse between the different tribes was formerly very important (184), and is still carried on in certain

parts (185). Trading has undoubtedly contributed to the spread of culture elements, although to a less extent than one is apt to suppose. A very considerable proportion of the traffic dealt with raw materials or with products the raw material of which had a limited distribution. Indeed, the motive power of all commerce is to seek in uneven distribution of raw materials. In Colombia, and also in Bolivia, the Indians formerly did much trading in salt (186). From the Incan domain, as from Colombia, was carried on a trade in gold (187) — and from the Inca realm also in silver (188) — but at no time was this trade of a volume sufficient for the tribes living east of the Andes to pass from stone age to copper or bronze age. Through the channels of commerce, distribution of European wares among tribes in the interior of the continent had an early beginning. One very notable trade route led from the coast of Guiana all the way to Rio Negro in Brazil (189). Another such route connected Paraguay with the Andean region (190). According to Heriarte (191), there was brisk intertribal trading carried in the Amazonas district in the 17th century.

Of most interest to us, when it is a question of throwing light upon the problems we are here discussing, is the trade in finished products. This class of commerce has been in detail studied by Koch-Grünberg in north-western Brazil and Guiana (192). The Schirianá, a very primitive tribe on Rio Uraricapará, an affluent to Rio Uraricuera, are traders in resin which they barter to the Kamarakoló and Taulipang for European goods and baskets manufactured by the latter Indians. The Yekuaná on the upper Rio Orinoco do barter trade in manioc graters, for which they from other Indians in British Guiana obtain dogs for their hunting, and muzzle-loading guns. Formerly these guns used to travel, by barter trade, all the way from the coast of Guiana right down to the lower Rio Negro. The Yekuaná also deal in finely woven baskets, and blow-guns. Of great importance in this part of South America is also the trade in arrow poison, curare.

The Yuracáre, a Bolivian tribe of Indians among whom I have sojourned, trade combs and feathers to the Quichua, and to the Indians on Rio Mamoré bits of skin of the toucan and, occasionally, bows and arrows. The Choroti and the Ashluslay of El Gran Chaco used in 1908—1909 to obtain, from a tribe whom the latter call "Manslé" (Lengua?) European goods as well as shell beads of Indian manufacture, for which they paid with skin mantles and wool (193).

Girbal y Barcelo describes (1790) how the Conibos in exchange for "mantas y resinas" obtained European tools from the Omaguas (194). Of early trading in pottery, Linné (195) has given a detailed account, chiefly from Heriarte. Heriarte (196) also mentions, from the Amazonas region, that barter trade was carried on in cotton yarn, maize, tobacco, paddles, canoes, slaves, articles of clothing, etc.

Many other instances might be cited. The question that here chiefly concerns us is that of the part played by commerce in the dissemination of culture elements. But its importance must not be overestimated. Because a tribe in the course of trading obtains a certain kind of article it does not necessarily follow that it copies that article. Frequently this is out of question, simply because the raw material is lacking, and a suitable substitute for it is not always easily to be found. In the old days the Cunas obtained poison from the Chocó. That particular trade has now come to an end, but this fact has not caused the Cunas to prepare poison for themselves.

In many cases trading intercourse is very insignificant even where the tribes are living at peace with each other. Such products of the Chiriguano and Chané as find their way, e. g., to the Chaco tribes are but few, nor is it very much that passes by way of trade from the latter to the former. The Indian tribes on the upper Rio Xingú do trade between themselves, but the trading area is very restricted (197).

Even by other means than travelling for the purpose of

trading is it possible for Indians of different tribes to come into peaceable contact with each other, although such occasions are fewer than might be expected.

In times of scarcity the Tapiete go to look for work among the Chiriguano or, although rather exceptionally, the Chané. They arrive with their wives and children, and settle on the outskirts of Chiriguano villages, where they build huts for themselves. They assist in work of all kinds, and are paid in maize. On their coming to the Chiriguano villages they bring with them nets of "caraguatá", dried fish, and other commodities, with which they do barter trade. In spite of these visits it is but seldom that any articles from the Chiriguano are seen in Tapiete huts, presumably because payment is made in maize, seeing that it is food-scarcity that prompts these outings. The remarkable thing is that the Tapiete are completely Guaranified, thus speaking Guarani and no longer their own language (198). They possess a culture almost exactly resembling that of the Mataco and Choroti Indians. From the Chiriguano they have not learnt much beyond to build rectangular huts the use of "tembeta", "chiripa" (199), a snare for parrots, and masks. In 1908—1909, when I visited them, their huts were both of round and of rectangular shape (figs. 61 a 62). In part their houses had changed shape owing to influence from the Chiriguano who, in their turn, have modified theirs from white influence. It is probably from the Chiriguano that the Tapiete have learnt the method of tanning with tree-bark, and this the Chiriguano have copied from the whites.

The Guaranification of the Tapiete is of special theoretical interest because it is illustrative of the exceedingly tenacious conservatism with which a people may retain its culture, in spite of losing its native language, so as to make it possible for the Chiriguano and the Tapiete to occupy such different levels of culture. It is very probable that in the olden days intercourse between the Tapiete and the

Chiriguano, unlike in our days, was not of a peaceable character, but that the Tapiete, in common with other Indian tribes, were slaves of that warrior people.

The fact of the culture of the Tapiete having, apart from the language, been so little influenced by the Chiriguano is due to the former being already better accommodated to their present environs. Like other Chaco tribes, the Tapiete have been influenced by the Andean culture.

Fig. 61. Tapiete hut of old type. (Author, phot.)

The Mataco-Vejos now and again work for the Chané, and are also in lively contact with the Chiriguano. Although they have preserved their own language, their culture appears to me to have been more strongly influenced than that of the Tapiete. Adopting the custom of the Chiriguano, they have now partly abandoned inhumation in favour of direct urn-burial; they have barns, raised on poles, for their maize, which they have learnt from the Chané, and so on. (200)

Of very great importance as regards the spread of culture elements are marriages between members of different tribes, though such marriages are not common. For the majority of the tribes, this practice is non-existent. The Chiriguano and the Chané never intermarry with the Mataco, Choroti, Toba, Ashluslay or Tapiete. Socially, it would be an impossible thing. Marriages between Choroti and Ashluslay are not uncommon on the border separating the two tribes,

Fig. 62 a. Tapiete hut of modern type. (Author, phot.)

nor are marriages between the Mataco-Notén and the Choroti, the Mataco-Guisnay, and the Ashluslay. These marriages have probably contributed to reciprocal acculturation among these tribes.

It is not easy for the explorer to get an opportunity for studying what some or other tribesman may have learnt whilst on a casual visit to some other tribe, and as a rule it probably does not amount to very much. When the

Chocó medicine man Selimo in my company visited the Bogotá Indians, he was much interested in their medicines and brought back from them a quantity of seeds and specimens of their medicinal plants. Besides, he collected curios such as, e. g., a fine specimen of coral, tortoiseshell, etc. Weapons, implements, and the like, he did not care for. In his garden Selimo had many medicinal and other plants, which he had grown from seeds collected by him on visits to kinsmen living

Fig. 62 b. Tapiete hut of modern type. (Author, phot.)

in other parts of the large tract of country inhabited by the Chocó. Selimo's nephew Alipio, a boy of about 12 who had been staying some years with Selimo, when returning to his parents who lived on Rio Pasutó, an affluent to Rio Docamparo in Colombia, took home with him a small but representative collection of plants which he had grown from seeds in a large tin can. By this means certain cultivated plants were given further dissemination. He also took with him a small canoe of a shape resembling those of the negroes and differing from the canoes used in his native country.

War might conceivably to some extent contribute to the spread of culture elements. That bride-capture is an effective agent has already been mentioned. As to whether booty acquired in war is occasionally copied, we have no knowledge. I was once among the Yanagua (Tapiete) shortly after they had looted some Tsirakua huts. They had brought back with them satchels, clothing, tools, etc. They made use of the satchels, but I do not believe they copied anything. The entire collection of loot was disposed of to me in exchange for some few trifling articles of barter goods.

To epitomize what I have said in this chapter, it may be supposed that working-methods, types of tools and implements and the like, gradually spread in a spontaneous manner from tribe to tribe. Important as dissemination agents in the case of culture elements of this description are intertribal marriages, whether they be peaceably contracted or effected by means of bride-capture. Thus it is characteristic that in all of the acculturation areas in South America intertribal marriages are common whilst in other parts they are rare. Extensive exogamy is calculated to enlarge the area of cultural influence. Of far greater importance to the spread of different types of culture are migrations when compared with loans between neighbouring tribes. Exceptions to this are found in cultivated plants and domestic animals, which, through being in great demand, with the greatest rapidity spread from people to people.

We have also seen how tribes may be living as close neighbours without borrowing from each other very much that is essential as regards their material culture, as for example the Tapiete and the Chiriguano, notwithstanding the former having exchanged their own language for that of the latter. Even their myths are quite distinct (201).

If it were true that culture elements very readily spread through commerce and casual intercourse from one tribe to another, the influence of the high culture east of the Andes

would have been far more intensive and not chiefly restricted to northern Argentina, El Gran Chaco, and a small portion of Mainas. It should always be borne in mind that Indian culture on the Andes and on the Peruvian coast during many hundreds, perhaps one or two thousands, of years must have been superior to Indian culture east of the Andes.

When it is not a question of new cultivated plants, or new domestic animals, man is exceedingly conservative.

I shall now proceed to give some account of variations as to form in various culture elements among certain tribes, a subject which is of interest both as a means of understanding how new inventions are made, and for the study of intertribal culture loans.

CHAPTER X.

Variations of form in culture elements.

By studying the variations of form in certain culture elements within a given tribe it is in some cases possible to demonstrate that some change is taking place which may be due to migration, culture loans, or independent inventions. I shall endeavour to make my meaning clear by giving some concrete examples.

As a general rule it may be said that all the members of the same tribe, provided they are similarly environed, of implements, weapons, tools, etc. — so far as these articles are for purely practical uses — only possess one form of implement for each particular purpose. Thus no tribe uses, side by side, fire-blowing fans of feathers and the same articles made of palm leaves; no tribe has two kinds of manioc graters, nor, for carrying heavy burdens, both baskets and nets; neither has it, or — so far as we know — has it had stone axes shafted by different methods. No tribe possesses paddles with handles and at the same time paddles without handles (202), nor bows of two different kinds. Many similar examples might be adduced. Even where technique is concerned, the presence of one method bars out the use of any other. Thus in pottery-making, no tribe uses for tempering-material both ash of bark mixed with sand, and powdered potsherds.

Exceptions to this rule are interesting inasmuch as they show that some tool, implement, or manufacturing method is about to displace something else in the same line. I will here give a few examples.

In tropical America there are two kinds of bedsteads, one of the ordinary "platform" type, the other the hammock. Of these, the former is preponderantly found in the west. Quite a number of tribes, however, use both the platform bedstead and the hammock. These are the Ijca, Chimila, Chiriguano, Chané, Chiquito, Guaná, Guaná (Arawak), and Cainguá. Among these tribes the hammock has not, so to speak, become generally established, and may therefore presumbly be considered a cultural element of more recent introduction than the platform. In America, hammocks are sometimes made of cotton, sometimes of bast. The use of the hammock appears chiefly to have been propagated by the Caribs and the Guarani. As it is, there are some tribes whose hammocks are partly made of bast and partly of cotton. These tribes are the Schirianá Indians, the Macusi, the Arawak on the coast of Guiana, Huanyam and certain tribes on the upper Rio Xingú (203). It is an open question whether these Indians did not formerly have hammocks made of bast, but are now changing over to hammocks made of cotton.

Round and rectangular huts occur side by side among certain tribes, as, e. g. the Chocó, but in most of these cases it is possible to establish that these people, under influence from the whites, are changing over to the latter style of architecture.

It is very seldom that one in any tribe finds more than one method of fastening the arrow feathers. Exceptions known to me are the Huari (204), Huanyam (205) and Parintintin (206) in Matto Grosso, who each employ two methods. The latter are a Guarani tribe, probably lately immigrated into their present territory. For their more perfected arrows used in war and for big-game hunting they employ the so-called Arará feathering, common among many tribes in Matto Grosso, whilst for simpler arrows they, like many other Guarani tribes, use the East-Brazilian feathering. Here it is clearly evident that in the region they are now occupying they have learnt a new method of fastening the feathers,

a method that supposedly would have superseded the old method, that is provided they had had occasion to use bows and arrows for a sufficiently long period. The Caingua, about 50 or 60 years ago, used arrows both with two and three feathers (207). Nowadays they exclusively use arrows with two feathers. In this case the new method has supplanted the old.

In museums large numbers of arrows are found incorrectly labelled as to from what tribes they originate. Where to one tribe are ascribed arrows with two kinds of feathering, it may be suspected that their origin is partly mis-stated.

In El Gran Chaco the Choroti and some other Indian tribes have bowstrings both of bast and of strips of hide. In those parts are also found the only Indian tribes in South America that are using both comb and brush (208). Further there are used both mantles of skin (by women) and woven mantles (by men and women). Their women wear hip-cloths both of deerskin and of woven textiles. Bowstrings of strips of hide, hair brushes, and skin mantles are, as I have pointed out in Part I, (209), culture elements indicating that Choroti or other tribes related to them have immigrated from the south. Of these culture elements the skin mantle, at any rate, is on the point of disappearing as it is being supplanted by the woven mantle. It is very characteristic that the more primitive dress is nowadays only worn by the women. As a rule it may be asserted that no Indian tribe possesses more than one type of comb (if various styles if its ornamentation be left out of account). Exceptions to this rule are, however, to be found. The Yuracáre possess two types of comb, one of their own and another that they not very long ago learnt from the mountain Indians to manufacture and now produce for exportation to the latter. The Choroti have two types, and the Tapiete as many as three, i. e. the one found among the Chiriguano and the Choroti, another occurring among the Choroti and the Ashluslay, and the type used by the Chané. The Tapiete also

possess a hair-brush, which supposedly is the original implement. The comb types are borrowed from neighbouring tribes, and none of them has so far gained general acceptance.

Fig. 63. Fowl-house from the Chocó Indians. Rio Sambú. Panama. (Author, phot.)

The Indians of South America pound and grind their corn by means of a hand-mill of stone (rarely of wood), or in a mortar. No tribe uses at the same time both hand-mill and mortar for reducing maize to flour. The Chocó of Darien, and certain civilized tribes of Mojos in Bolivia, who grind

maize by means of stone mills, use wooden mortars for husking rice, a method they have learnt from the whites. The mortar has in this case made its entry along with a new culture plant.

Fig. 64. Fowl-house from the Chocó Indians. Rio Sambú. Panama. (Author, phot.)

Not even when living along the same river do the Chocó adhere to a uniform type of fowl-house (figs. 63—65). This, I am inclined to think, is in some way connected with poultry-keeping in that region being a new culture element. Many methods are employed by them for protecting the fowls

against wild animals, but none of them has so far become throughly established.

Other examples might be adduced, but it may however be stated as a general rule that as regards implements, and the

Fig. 65. Fowl-house from the Chocó Indians. Rio Sambú. Panama. (Author, phot.)

like, used for some practical purpose, it is seldom that among the same tribe one sees more than one form for the same use.

Strangely enough, however, the implements, weapons, etc., used by different tribes are almost always in some respect different as regards details, and this quite apart from their

ornamentation. It is only in some few acculturation areas that the cultures of the various tribes have become so completely alike that they have exactly the same kinds of weapons, implements, etc.

In the case of objects of minor utilitarian importance, great variety as to form is often found within a tribe. This again varies, however, between the different tribes, and it is very characteristic that a tribe may specialize in some object or other which they elaborate into a great number of forms which, nevertheless, are of no practical significance. The Chiriguano and the Chané, for example, manufacture vessels of many different types.[1]) But it is not in the vessels of everyday utility that this profusion of forms obtains, but in the vessels that are manufactured for festivals. Ceramics is an art in which these Indians have specialized — in no other direction have they advanced equally far.

What has just been said of the Chiriguano and the Chané also applies to a tribe very far removed from them, viz. the Chocó. These people manufacture great quantities of clay vessels of different shapes, which are used at their incantations and, strictly speaking, are of no great practical importance.

All those different clay vessel forms that I have collected, e. g. from the Chiriguano and the Chané, or from the Chocó (fig. 66 a. b.) were not manufactured by a single individual but by many, and therefore represent both the form-variation possessed by each individual artizan and the variation that is found among a body of artizans. In getting collections together one ought, of course, always to note down the names of the individuals that have manufactured the different objects, but this I have only done in scattered instances, which of course I must admit to be an oversight. I may, however, take some comfort from the fact that I am not alone as regards collecting in this way. Nevertheless it is all the more important as individual specialization is very great.

[1]) A detailed account is given in Part 2 of my "Series".

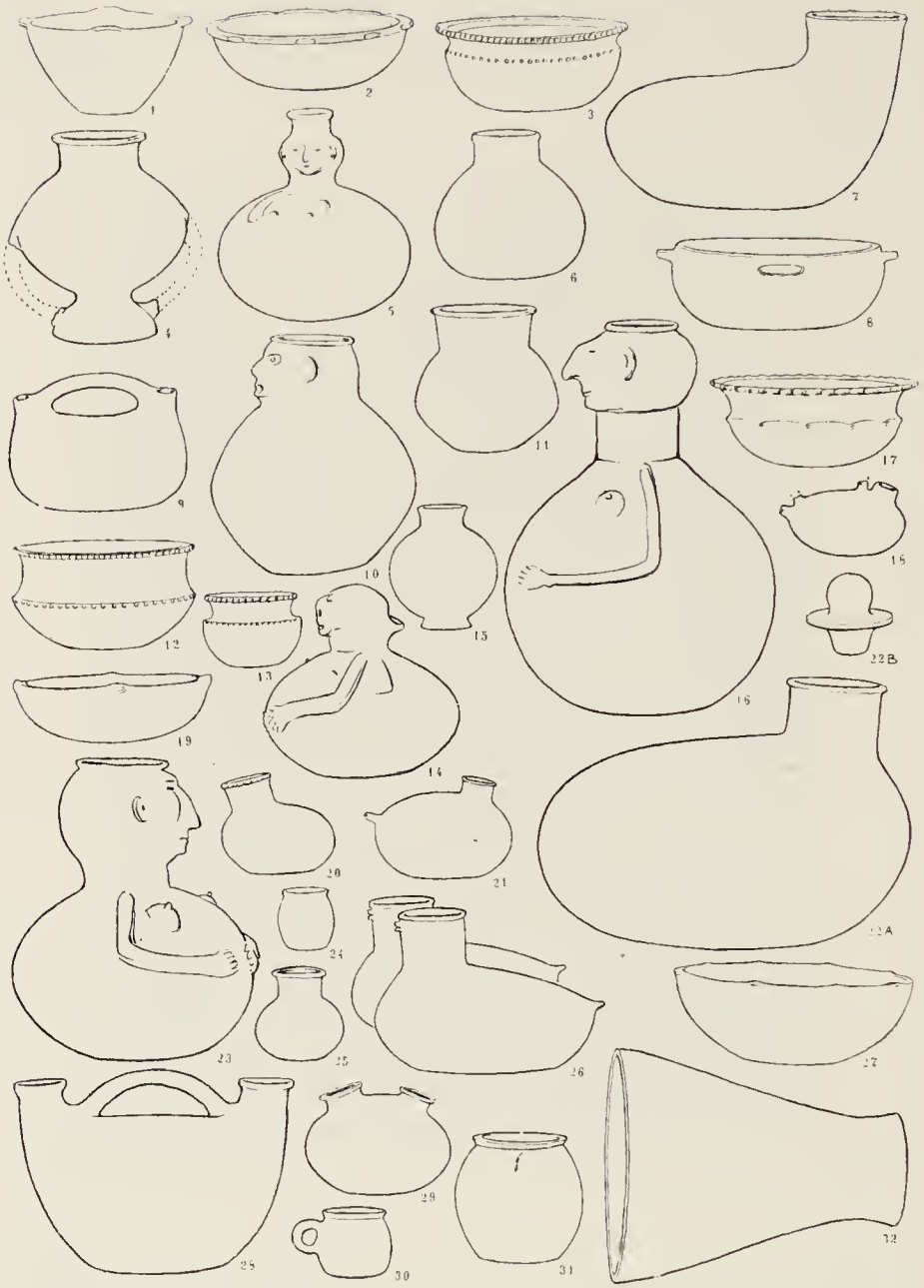

Fig. 66 a. Types of pottery from the Chocó Indians in Panama and Colombia.

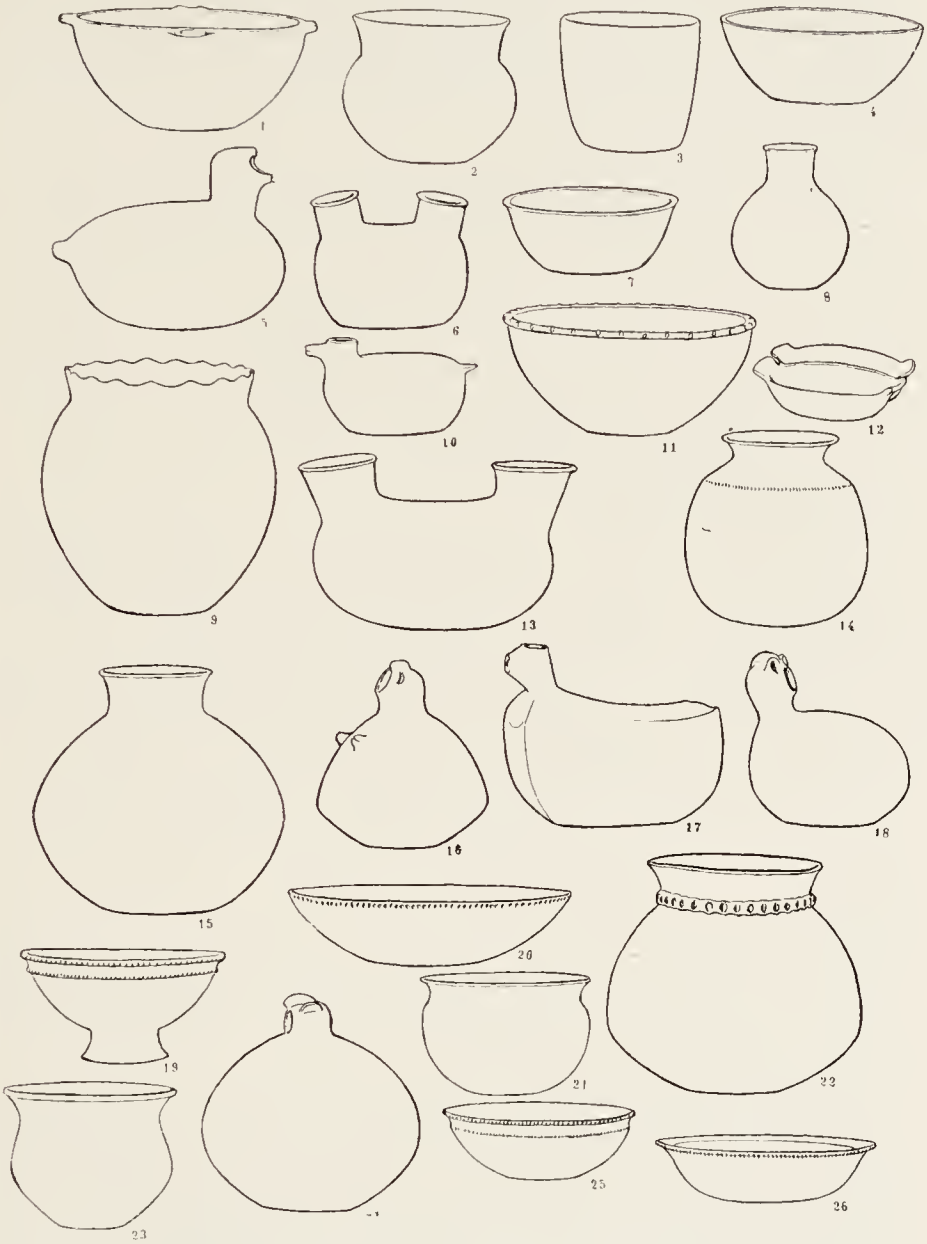

Fig. 66 b. Types of pottery from the Chocó Indians in Panama and Colombia.

Among the Chocó Indians on Rio Sambú in Panama, for instance, there was, properly speaking, only one woman that manufactured the best quality clay vessels. Among the Chané, certain women were especially reputed for prominent skill as potters, as for instance the wife of the chief Vocapoy, on Rio Itiyuro.

Persistently conservative, these Indians of widely scattered abode have as already mentioned very seldom cared to make any copies from the very considerable variety of European earthenware or tinware utensils that they have seen or been in possession of. It would generally speaking be natural to suppose that where industrial art aims at great variety of form there would be a keen desire to copy foreign designs, but such is not the case.

The Chocó Indians manufacture all manner of shapes of seats (fig. 67), of which many of the lower kinds are used as head-rests. Selimo, the medicine man, always when travelling with me, carried with him, a pillow of that kind, which he never used for a stool. Pillows of this type are even mentioned by Oviedo, from the Chorotegs. (209 b). These head-rests greatly recall similar contrivances in Oceania. The majority of the tribes possess only one or two types of wooden seats, as for example the Huanyam, the Huari, and the Cuna, the latter being neighbours of the Chocó.

Most Indian tribes whose paddles have a crotched handle have only one type of crotch. The Cayapá have handles of great variety as to form (210).

The Gothenburg Museum possesses a very comprehensive collection of tobacco pipes from the Choroti and Ashluslay. These include an exceedingly wide range of forms and convey the impression that above all originality has been aimed at, without in every instance remembering that the principal function of a pipe is tobacco-smoking. (fig. 68).

It is a noteworthy circumstance that especially in the Chaco, where at the time of the Discovery tobacco-smoking

must have been rare,[1]) there are in our days to be found a greater number of tobacco-pipe types than in all the rest of South America. Among them also occur types of pipes that are not elsewhere found in South America. Can this fact be ascribable to this culture element being, in El Gran Chaco, comparatively new, so that in consequence no particular type has been definitely settled upon?

If this should apply to the pipes among the Choroti, and others, it obviously is not applicable to the ceramics of the

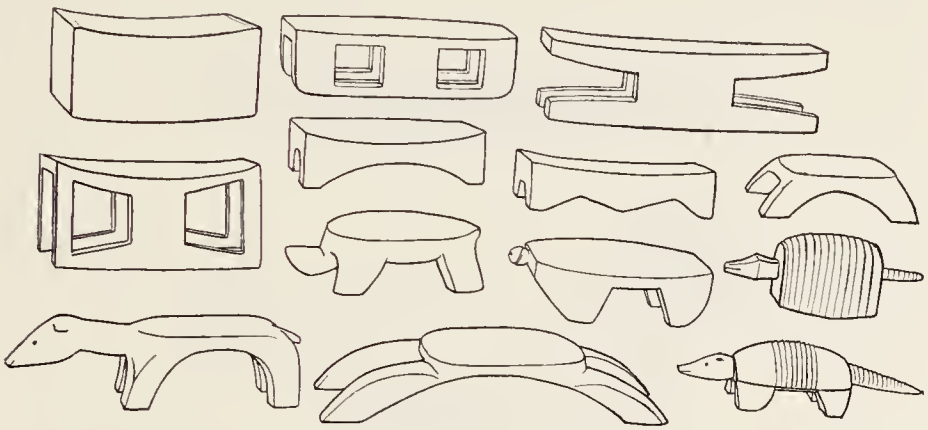

Fig. 67. Wooden seats from the Chocó Indians in Panama and Colombia.

Chané and Chocó, which evidently are very ancient, as is proved by forms and ornaments having been preserved from as far back as pre-Columbian times (see p. 157).

The Indians of El Gran Chaco, as e. g. the Mataco, Toba, Choroti, Ashluslay, and others, are exceedingly skilful in manufacturing sewn and knitted nets of caraguatá bast. Among them there obtains far greater variety of technique in this handicraft than among any other tribes in the whole of America who go in for similar work. Of these technical methods one or two are not known from any other part of

[1]) As it is not mentioned by Schmidel or other investigators who first made a study of these regions.

America. In no other sphere of handicraft have these Indians attained anything approaching the same artistic skill.

One wonders which of these industries that are especially developed among certain tribes regularly are men's or women's work and we shall find that great variety obtains on this point. It is however preponderantly in the industries allotted to the women that great variation of form is shown. Among the Chiriguano, Chané and Chocó it is the women who are the workers in ceramics, and this is the leading

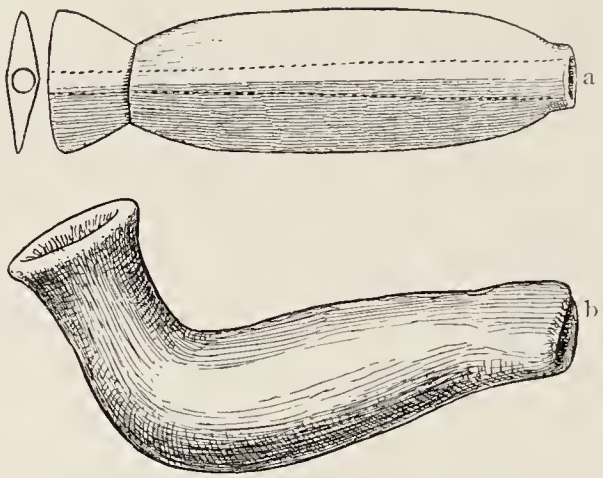

Fig. 68 a–b. Tobaco pipes from El Gran Chaco. a. R. M. M. 482; b. G. M. 13. 1. 512.

industry of these Indians. In the Chaco, the manufacture of the finer kinds of caraguatá nets are in the hands of the women. It may further be asked whether specially developed industries of this kind are only found among somewhat larger and more prosperous tribes, and, on the whole, this is so. It may also be asked: when in a certain industry there is great variation as to forms, is this due to the industry being in the hands of certain individuals, certain specialists? My own experience affirms that this is so.

If we take an instance outside South America, there are in California certain tribes, e. g. the Pomo, who have attained a skill as basket-weavers that probably stands unsur-

passed in the whole of America, and it is the women who are the basket-weavers. Such variety as is found in the mussel-shell beads of Sa. Rosa Island does not, it seems, exist anywhere else. If it did, it would be in some other part of California. Most tribes content themselves with one or two forms of mussel-shell beads.

In an industry in this way constituing the speciality of a certain people it is obvious that more or less important inventions are more likely to be made than if the industry only has for its purpose the meeting of every-day utility needs. If all clay vessels, as, e. g., among the Chocó, (fig. 66) are of somewhat different shape, this must be due to a seeking for different forms. When a people, as, e. g., the Chacobo, possesses an abundance of clay vessels, yet always adheres to the old-established forms, it is unlikely that any new inventions will be made. It is obvious that, e. g., quite a number of mussel-shell ornaments have been independently invented in California because none exactly similar have elsewhere been found.

Many other examples might be adduced.

It should also be pointed out that there are many tribes that do not in any particular sphere manufacture a mass of articles of great variety as to form, tribes that possess no speciality of their own. At most, there occur certain minor variations in the way of designing their ornamentation. Tribes of this category whom I know from personal experience are the Chacobo, Yamiaca and kindred tribes, the Huari, etc. The fact that production shows a paucity of forms, does not necessarily prove that an industry is on a low cultural level. For the few forms that are produced may be of both careful and artistic manufacture.

There is another department where for different tribes variation as to form may range very differently, and that is personal ornamentation. Among some tribes all individuals of the same sex wear ornaments so closely similar that it gives the effect of being a sort of uniform, whilst among

other tribes individual taste is allowed very wide play. For example, among the Chacobo the men wear ornaments that are almost exactly similar, and the same applies to, e. g., the Chocó, Chiriguano and Chané. In the Chaco great divergency prevails. Among a crowd of Ashluslay men, one individual may perhaps be wearing a knitted cap decorated with mussel-shell spangles, another a feather ornament stuck in a head fillet, or a fillet made from palm leaves, or again a woven fillet, and so on (211). The same man may on different days wear quite different ornaments. While, e. g., the Chocó always wear their breast-bands in a certain fashion, the Choroti and the Ashluslay foppishly arrange them differently on different days.

That an industry is expressed in a variety of forms does not however necessarily prove it to be on a higher level than if only a few forms are produced. The Yokuts of California, whose ceramics are of an inferior standard, have not, as remarked by Kroeber (212), standardized the forms, but in their industry show great variation as to form in their crudely modelled vessels.

It would be very interesting to know the degree in which an Indian tribe is conservative in the matter of forms and ornamentation. How long does it take for the style to change? Of this one might form an estimate if one had two collections from the same tribe, separated by an interval of several centuries. No such collections exist from any Indian tribe in South-America that, for such a length of time, has preserved its culture unimpaired by the devastating influence of the whites. We possess, it is true, archaeological collections from the Quichua, dating from the time shortly preceding the discovery of America, and also ethnographical collections from modern times, but subsequent to the Discovery the Quichua have, from white influence, become decultured to such an extent that in our times it is difficult to study them.

That ornamentation may have been very conservatively preserved is apparent from the study of Chiriguano and

Chané ceramics. As already mentioned, the Chiriguano in the early part of the 16th century obtained by conquest their present territory, and then subdued some tribes who were strongly affected by Andean influence. In their modern ceramics are throughout preserved the finger-impression ornaments that they brought with them when they emigrated from Paraguay (213), and in some instances —

a b

Fig. 69 a. Chiriguano vessel with ornamental design consisting of hour-glass-shaped figures interrupted by parallel lines. E. 914. b. A plate from the Inca culture found near Cuzco with the same ornament. G. M. 23. 5. 37.

in a wonderful way — also the Andean ornaments. Thus, as regards the more complex of these ornaments, they still retain an ornamental design consisting of hour-glass-shaped figures interrupted by parallel lines (fig. 69 a) which in South American archaeology is only known from ceramics pertaining to the Incas or influenced by Incan culture (fig. 69 b). They also possess the double spiral (fig. 70) that in South America was characteristic of the pre-Columbian culture throughout northern Argentina, northern Chile and southern Peru (e. g.

Mollendo). These ornaments must have been copied from generation to generation for more than 400 years without any change.

Besides, the spiral is of general occurrence in large tracts of South America, but it is exclusively among the Chiriguano and the Chané that nowadays the double spiral typical of the southern Andean culture occurs. The rather tree-like ornament seen on the clay vessel in fig. 71 is also very typical of Incan ceramics.

Fig. 70. Chiriguano vessel with double spiral. R. M. 1001.

Further instances might be given, but then they would refer to such simple things as rows of triangles, lozenge designs, and the like. It is evident that the Chiriguano and the Chané in a conservative way have for centuries maintained a very homogeneous ornamentation, and, with the exception of finger-impression ornaments, it is the ornamental system of the latter that has been kept up. We know that when the Chiriguano conquered the Chané, they took possession of large numbers of their women, and it is this female element that among the former has carried on tradition, as it has similarly been maintained by the women of the Chané, a tribe formerly dependent, but now independent, of the Chiriguano. (214) The Chané, as far as may be judged, belonged at the time of the Discovery to the Andean

culture area, in particular to the one we know by the name of the Diaguitas or Calchaqui culture. It is an open question whether the Chané were not related to the Diaguitas and whether the latter, like the Chané, consequently were Arawaks.

An interesting example in the way of ornamentation is furnished by the round whistles of the Chiriguano, Choroti, Ashluslay and Churápa, which among these various tribes bear ornaments that as a rule are identical (fig. 72). This circumstance cannot be explained otherwise than by these ornaments having been used for centuries.

Fig. 71. Chiriguano vessel with tree-like ornaments. E. 927.

Archaeologists are especially inclined to attach great importance to similarity in ornamentation and style between ceramics of different localities, and therefrom to infer cultural intercourse. The importance of such studies is no doubt very great also as regards to America, but it is necessary to proceed with greater circumspection when drawing conclusions from minor correspondences in ornamentation than occasionally is done. One and the same simple mathematical ornament is no doubt capable of being independently invented in different localities. The hour-glass ornament just referred to was of common occurrence on Incan ceramics in pre-Columbian times (fig. 69 b); it is still common in El Gran Chaco, inter alia painted on skin mantles (fig. 73). It also occurs on Aymara weavings, and in this case it can

be shown to constitute a simplified version of the Habsburg double eagle (fig. 49). That I nevertheless consider the hour-glass ornaments on the Chiriguano clay vessels as having been conservatively preserved since Incaic times is because of the conformities as to details (fig. 69). There is not the least doubt that aryballos, a certain form of footed bowl, a type of dish with a small head or handle on the rim and a few other types of clay vessels may be regarded as, so to speak, "zonal fossils" indicating the extension of the Incan realm (215). In northern Argentina, which belonged to the

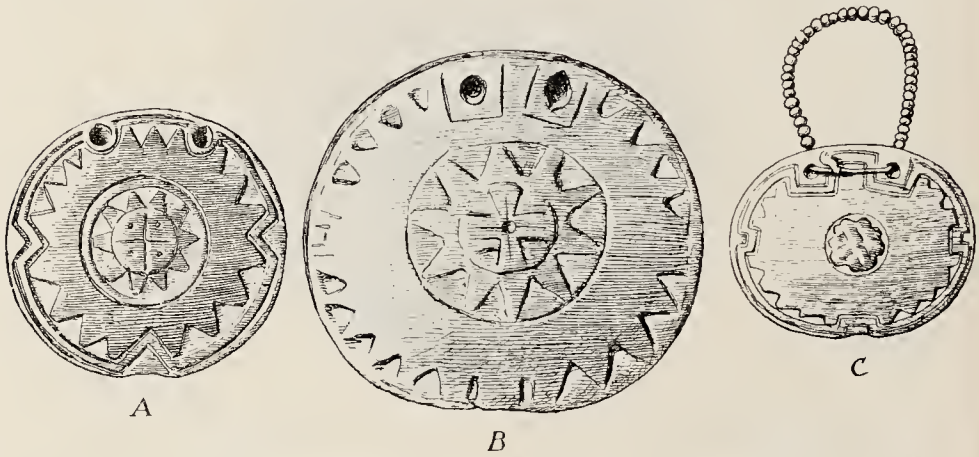

Fig. 72. Whistles. a. Churápa R. M. Tj. 71. — b. Chiriguano. R. M. E. 91. — c. Choroti. G. M. 13. 1. 88.

outlying ranges of the Incan realm, in archaeological excavations are found these types of clay vessels bearing local *native ornamentation*, and even elsewhere, as e. g. in Ica, it is found that the migratory forms have proved more conservative than the ornamentation. Beyond the historical borders of the Incan realm we nowadays find only one of these clay-vessel forms, viz. the aryballos, which occurs in the Chaco, where influence from the west was so strongly active, and then in a highly modified form (216).

If, for example, among pottery fragments belonging to two cultures far removed from each other we find many that are bearing similar ornaments, the importance of this

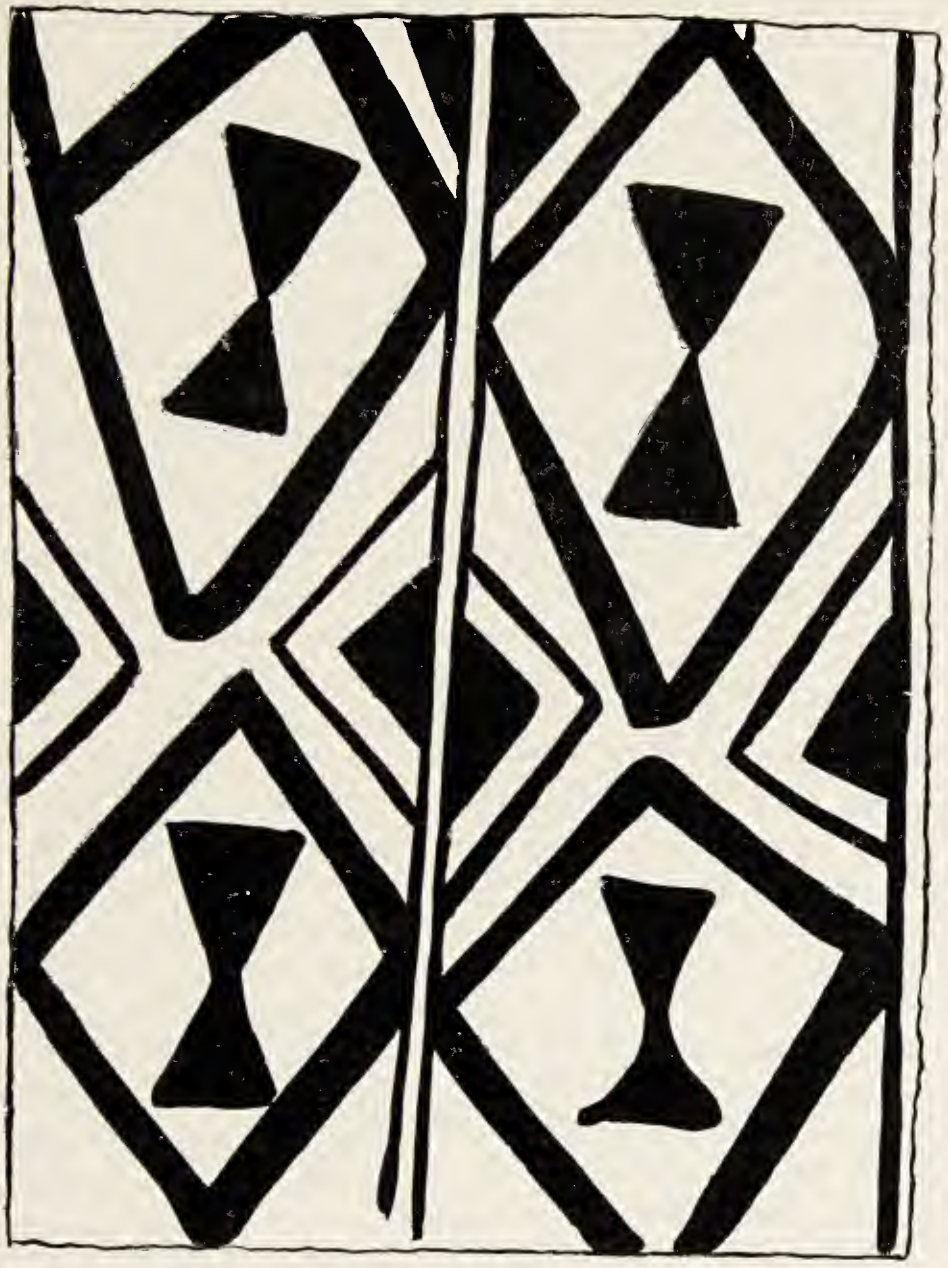

Fig. 73. Part of a skin mantle. Mataco. R. M. 03. 3. 404.

circumstance is not only to be estimated according to the prevalence of similarities but also according to how this prevalence refers to the variegation of ceramic forms.

CHAPTER XI.

How far a culture element's history may be read from its distribution.

Culture elements acquired by the Indians from the whites cannot be of homogeneous distribution for the reason that the whites almost simultaneously from many different points on the coasts of Central and South America began their colonizing activities. A culture element introduced into America via Buenos Aires cannot have attained a distribution similar to one that entered via Panama.

In Part I of my "Series" I have, as mentioned, shown that in El Gran Chaco there occur a number of culture elements, such as tapestry-weaving technique, the "tsúka" game, knuckle-duster, spangle decoration with shell beads, etc., that in the remainder of South America are not found outside the Incan domain. It is quite evident that the Indians of the Chaco have borrowed these elements from the culture area in the west, a fact that in the case of the "tsúka" game is also capable of being linguistically proved.

The culture elements that the Indians of the Chaco have obtained from the west are fairly uniformly distributed in South America, where their history is the same, i. e. in that country their origin lay in the west.

That their distribution in South America is uniform does not necessarily mean that they are of common origin. Calabashes with star-shaped lids carved from the same fruit as the box are an invention not known in America beyond the western South America and the Chaco. Analogies to the "tsúka" game are known from North America, as are also

many others of the culture elements with the distribution here given.

We shall now turn our attention to another, similar, survey as regards distribution, and then see whether any important inferences from it are justifiable.

In the south of South America a great many culture elements occur that are also found in North America but not in the intervening regions, or are there very rare. (217). From this I have formed the conclusion that in the south of South America as well as in North America are found the relics of a culture stage which in the intermediate regions has either disappeared or left only very few traces.

In El Gran Chaco and adjacent territories, for example, the following elements are still to be found, or occurred in post-Columbian time: —

Steam-bath houses
Pit dwellings
Skin mantles
Loin-coverings of tanned deerskin
Leggings
Fringed leather
Embroidery on skins
Three-feathered arrows
Fish glue used for fastening the feathers to the arrow-shaft.
Arrow quivers
Hair-brushes
Combs carved in one piece
Paddles without crotched handle
Double-bladed paddles
Scalping
Smoke-signalling
Dance with deer-hoofs at girls' puberty rites
Tortoise-shell rattles
Hockey games
Racquet do.
Ring-and-pin do.
Monitor-pipes
Finger-mutilation as a sign of mourning
Edge-seamed bags
Wedges
Arrow-swallowing
Edge-seamed bags (218).
Bags of bird-feet bags (218).

The above forms an imposing array of culture elements, the majority of which are largely independent of environment. At the same time some of them, e. g., the skin mantle and the pit dwelling, may, in North America as well as in the far south of South America, be adaptations to the cold climate. *The value of correspondencies in other respects entirely depends on the numerosity of the cases in point and the degree of their complexity.* In the same way the Fuegians possess quite a number of culture elements that only occur among them or elsewhere in the extreme south of South America and also in North America. Among the elements may be noted, sucking tubes, back-scratchers, ladder-like cradles, etc.

In the foregoing I have mentioned that certain migrations in very brief spaces of time covered immense distances. Hence it appears to me that the only possible way of explaining the correspondencies between the cultures in North America and southern South America is that the peoples who moved from the north to the south did not remain long enough in the tropics for losing their original culture. In the Fuegian culture proper there now remains nothing to indicate that these people once lived in a tropical climate.

If it be correct that the Indians in the extreme south of South America have retained a considerable number of culture elements from the time of their immigration from North America, it is obvious that this must have taken place in a very remote past, before the rise of the high cultures of Central America and western South America. The culture elements here enumerated as being common to the southern extremity of South America and to North America, but absent in the intervening regions, must therefore be of extremely ancient origin. All of these culture elements may at the same time quite possibly have come from Asia into America, via Bering Strait.

That in this case I consider it probable that the existence in southern South America of numerous culture elements in

common with North America points to community of culture is due, as mentioned, to these correspondencies being of so great a number.

It is an altogether different matter when a culture element has a duplicate or manifold distribution not resembling the distribution of any other culture element. In such cases an identical invention would in different localities appear to be of different origin. This may be due to the invention having twice been made in America, or to its having there originated within a certain area whilst having been introduced abroad to some other area or, again, that it has been introduced into America by different routes.

Again there are, e. g., whistling arrows, for using with the bow or with the throwing-stick, found in the Amazonas region and the Isthmus of Panama. According to Thalbitzer, the same idea is known from the Angmagsalik Eskimo (see Appendix 10). No cultural element in America is known to be distributed in this way, which makes it probable that this is an invention the origin of which South America and Greenland do not possess in common. Whether this invention was independently made both in Greenland and in South America, or whether by some route or other it was brought over from the Old World, is more than I can say.

To cite one more instance of two-fold distribution: Footwear of some sort or other is especially of widespread distribution in western South America. As a general rule the Indians wear leather sandals. The Tsirakua of northern Chaco, and the Chocó on the upper Rio Baudó in Colombia are the only ones wearing wooden sandals, so as to protect their feet against thorns. Between these tribes the wooden sandals show considerable difference as to shape, and it is entirely out of question that the idea of using this kind of footwear would be of an origin common to the two tribes concerned, who are far removed from each other, and for the rest possess altogether divergent cultures. In the intervening regions there is no occasion for the use of this

kind of sandals, which are only adapted for special conditions, and there exists no evidence whatever indicating that the Tsirakua and the Chocó at any time have been neighbours. If a culture element, whose coming into being is due to local conditions of a very special nature, is found to exist in two separate localities on the globe, it cannot derive from a single source unless the peoples who possess this culture element at some time have been neighbours and then lived in environs of exactly the same peculiar character. It is quite evident that the wooden sandal of South America has been invented twice over.

If it be conceivable that in America identical inventions not everywhere necessarily are of a common origin, there can be still less difficulty in supposing that if similar inventions exist both in the Old World and the New, they cannot originate from the same source. This is applicable not only when we are able to prove that inventions in America have passed through a course of improvement from some extremely primitive form to a highly complex one — of which I have given several instances — but also when the forms are almost, or nearly, identical.

CHAPTER XII.

How far culture loans are determinable by linguistic comparisons.

As a general rule it is safe to say that the Indians when they possess Spanish or Portuguese words for a culture element they have borrowed it from the whites. For that reason I consider that the membrane drum in Guiana and in north-western Brazil, respectively, is a loan from the whites. In those tracts its Indian name is "zambora", "tambora", or something similar. Against this, W. E. Roth (218) points out that in Guiana the word for dog is "pero", from the Spanish word "perro", although we know that there the dog is pre-Columbian. The reason for this is probably that the Indians called the dogs of the Europeans 'pero', so as to distinguish them from the small native breed of dogs. The latter, as we know, were rapidly supplanted by the dogs of European breed. The fact of the majority of the Indian tribes calling the pellet-bow 'boroque', or 'bodoque', from the Portuguese word 'bodoque', goes to prove that the pellet-bow is a culture element introduced into America in post-Columbian times.

In the same way it should also be possible to identify quite a number of culture elements as being loans from one Indian tribe to another. Thus I have shown that the 'tsúka' game in the Chaco must have been borrowed from the Quichua Indians because of certain numerals used for keeping the score in this game being Quichua words. In Part III of this Series I have also pointed out that the Yuracáre, who, according to tradition have learnt from the Mojo the use of canoes, call these 'pajure', from the Mojo word 'pacuure'.

Many other instances might be cited, but unfortunately this department of the Indian languages has been very little studied. I am not, however, absolutely certain that the study of borrowed words in the Indian languages would be productive of such exceedingly valuable results as a similar investigation in Europe.

If we study the maps in Part V of this Series giving the distribution of the Indian names for the banana, common fowl, knife, etc., we shall find that in many cases the Indians borrowed the Spanish or the Portuguese word, but that just as often they have created new words for the new culture elements. As I have said, this department of Indian culture still remains to be thoroughly studied.

An especially profitable field for the study of borrowed words is provided by the cultivated plants because their names are so largely recorded in different languages. I will here adduce an example.

I suppose that most Americanists will agree that of the three most important linguistic groups, in South America, viz. the Arawaks, Caribs and Guarani, the lastmentioned have been the last to spread about. Their migrations, as we know, very largely took place in post-Columbian time. As might be expected, the names of the ordinary kinds of cultivated plants are very much akin among the different Guarani tribes, even though nowadays they are settled at great distances form each other. Let us now for example run the eye over a list of words for maize and sweet potatoes, respectively, in the main without to change the spelling we find in the different vocabularys.

Tribe	*Maize*	*Sweet potatoes*
Anambé	awati	gitika
Apiacá	aouassi	yiti
Auetŏ	avatsi	yeto
Cainguá	avaĕi	yetý
Chiriguano	avati	yeti

Emerillon	aouassi	zétic
Guajajará	awači	zitika
Guarani (Paraguay)	avatí	yeté
Kamayurá	awat-i	yetük
Manajé	awači	yetỹ
Omagua	ahuati	ytica
Oyampi	aouassi	yétic
Pauserna	ahuati	yéte
Tapirapé	awači	jetúka
Tembé	awači	zetýka
Tupinambá	auaty	jetteki
Turiwara	awati	jetýka

The only Guarani tribes with an entirely different name for maize are the Manitsaua and the Mundurucu, and, for sweet potatoes as well, also the Maué. The firstmentioned of these tribes is exceedingly little known, and the Mundurucu are probably Guaranified.

Many tribes who are neighbours of Guarani peoples, and speaking entirely different languages, have names for sweet potatoes that may have been borrowed from the Guarani.

Tribe	*Maize*	*Sweet potatoes*
Apinagé	cuecàcrenki	joto
Canella	põhỹ	zēd
Caraho	poouti	joto
Choroti	péāta	wuiti
Crengez	põhỹ	je
Timbira	põhỹ	jed
Vejos	(is)-pa	yetig

It is evident that these minor tribes did not possess sweet potatoes before they became acquainted with Guarani-speaking Indians, but that, on the other hand, they possessed maize. This fact appears to prove that as a cultivated plant the sweet potato is of a later date than maize.

If we pass on to the Carib peoples we find e. g. the following names for maize and sweet potatoes, respectively.

Tribe	*Maize*	*Sweet potatoes*
Aparai	achinacé	napi
Apiacá (Pará)	anat	nabiot
Arara	conat	napiat
Arecuna	anazi, anáha	nahoto
Bakaïrí	anázi	
Caribs (Antilles)	aoachi	nabi
Chakes	me	chak
Cumangoto	anaze	chaku
Galibi	aouachi	napi
Hianacoto-Umaua	anaje	nahi
Ipurucoto	anain	sacu
Kalina	awasi aunei	napi
Macusi	anai	sá
Nahuqua	aná	aniza
Motilon	mayis (sh) a kariaco	chac
Oyana	enai	napi
Palmella	éna	napihe
Piánacotó	enaye	napi
Trio	anai	nápi

It is evident that when the Caribs spread over the South American continent they were already acquainted with the sweet potato and, of course, also with maize. That is to say, it is possible that already at that time they had split up into two groups, the one calling the sweet potato "napi" or "nahi", the other "tsa", "chac", "chacu", etc. A certain degree of family likeness will be noticed between the names by which the Betoya group call the sweet potato, viz. "yápi", "yaxpi", and the Carib word "napi".

As regards the Arawaks, to a great extent they have the same word for sweet potato as the majority of the Pano tribes, viz. "kári". This word, "kári", is met with all the way from Rio Beni to Guiana. It would seem as if the Pano peoples had got to know the sweet potato from the Arawaks, or vice versa. As to maize, the Pano tribes and the Arawaks use entirely different words. It is interesting to note that the Arawaks on the upper Rio Xingú, whose name for maize is "maiki", use a word for sweet potatoes, "uhú", which entirely differs from the corresponding word among their kinsmen of other regions.

The variety of the names by which the sweet potato is known in different languages indicates that the cultivation of this plant is of great antiquity in America. A comparison of the words for sweet potatoes with those for maize will, however, show that maize is older as a cultivated plant.

It will be apparent that the sweet potato, and probably also the bottle-gourd (Lagenaria),[1] are later culture elements in America than maize. If it be the case that these cultivated plants were brought from Oceania to America, the Indians of the latter Continent were already agriculturists at the time when that importation took place. Had they not been agriculturists, they would not have learnt to cultivate these plants unless cultural influence from Oceania was exceptionally intensive. We know how hard it is for nations of fishermen, gleaners or hunters to become agriculturists. In the same way it can be shown that our common kidney, French or haricot bean (Phaseolus vulgaris) is in the Amazon region of a later date than both maize and the sweet potato.

What is exceedingly remarkable is that the Quichua In-

[1]) The study of the distribution of the various names for the bottle-gourd presents very great difficulties, partly because the vocabularies do not always differentiate between this plant and the calabash tree, and partly because one cannot always tell from a vocabulary whether the calabash fruit or a calabash bowl is referred to. According to what I am informed by Dr. Kidder, the bottle-gourd is not found in the basket-makers' cave, in south-western North America.

dians, in the Chinchasuyo dialect, towards the end of the 16th century called the sweet potato "kumara" (219), a word which is very wide-spread in Polynesia and Melanesia. The significance of this word has especially been pointed out by Rivet, who considers it as proving that the sweet potato in America originates from Oceania. It is of course not impossible that the Polynesian name of this plant has lived on ever since the time it first became known in America; we know how conservatively the Arawakian word for maize survives among Arawak tribes that have had no contact with each other for a very long time back, but it is strange that the word "kumara" is not more widely distributed in America. There is a tinge of newness about it in the Chinchasuyo dialect of the 16th century, and none of the neighbouring tribes have adopted it.

There is a slight possibility that the word "kumar" reached Peru along with Mendaña in the same way as the word "yuca", for "mandioca", was introduced by the Spaniards into Peru from Haiti, and subsequently incorporated with the Quichua language. Mendaña returned to Peru from the Solomon Islands in 1569. The first appearance of the word "kumar" in South American literature was in 1582, in its Spanish form of "comales", and only in 1586 is it found in any Quichua vocabulary. Friederici (220) on the other hand is of opinion that it is only through the Spaniards that the sweet potato became known in Oceania, and that it was Mendaña's expedition that there introduced "comales" (kumar) as the name of it.

As to who is right and who is wrong on this point may presumably be left for future research to determine. It is however an irrefutable fact that the sweet potato is in America a very old culture plant, though not of such great antiquity as maize.

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admiré), y fué que dentro de los mismos rios, y por la madre que hace el agua que por ellos corre, nascian destas fuentes salobres, y los indios con grande industria tenian metidos en ellas unos cañutos de las cañas gordas que hay en aquellas partes, á manera de bombas de navíos, por donde sacaban la cantidad del agua que querian, sin que envolviese con la corriente del rio, y hacian della su sal."

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80. Comparative. Vol. 5.
81. Comparative. Vol. 5.

		Dog.	Jaguar.
82.	Apinagé	robo	robocrori
	Aponegicran	orópa	orópa
	Arara	ocori	ocori
	Atsahuaca	inahuahua	inahua
	Bara	(nd) yái	yéidodogé
	Caingua	yaguá	yabukú
	Camacan	jaquieh	jacque-dere
		jaké	
	Caraho	róbo	róbo
	Carijona	kaĭ″kusi	
		kaikuči	kaikuči
	Cayubaba	nahua	yedáhua
	Cocama	yahuara	yahuara
	Crâos	rópo	rópo-dóle
	Crichana	aqueré	equeré
	Emerillon	zaonat	zaonat
	Encabellado	yay	ayro-yay, ma-yay (ma-red; airo forest)
	Esmeralda	quiné	muto-quine
	Galibi	caïcouchi	caĭ″couchi
	Guarani		
	(Paraguay	yagua	yaguarete (eté-real)
	Iquitos	muicra	muicra
	Jamana	yama	yama
	Juri	weri	wehay
	Kobéua	yauími	yaui
	Maku	yãm	yam
		mẽhíu	hiu
	Maku-nadöbö	yawara	awat
	Miraña	ouíbe	uipe
	Omagua	yaguara	yahuara-huásu

Oyampi	yaouare	yaouare
Oyana	caïcouchi	caïcoui
Paumari	jumāhi	jumahi'
Peba	nemey	nemey
Puinave	iot	iotdam
Sära	yái	yái
Ticuna	hei, ay	hei, ay
Trio	káikui	kaikui
Yagua	nimbu	nimbu

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176. » » Vol. p. 12.
177. » » Vol. 1, p. 12.
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185. = 192.
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209b. Oviedo. T. IV, p. 109 "é por almohada tenia un banquito pequeño de quatro pies, algo cóncavos."
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APPENDIX I.

The use of enema tubes and enema syringes among Indians.

The distribution, mode of using, and form variation of the enema syringe in America have a direct bearing upon the problem here discussed because, as has been mentioned, in this department the Indians have made a very important invention from which even we of the Old World have derived great benefit. Moreover, everything goes to show that the peculiar idea of using enematic injections has probably been independently invented both in the Old World and the New. And, as I shall describe in detail further on, the Indians also employ narcotic clysters. So far as I know, this kind of injections has only in modern times come into medicinal use among us, and thus the Indians also in this department have independently made an important invention.

If we collect all the references in the literature, dating from the era of the Discovery right up to modern times, to enema syringes and their uses among the Indians, we shall find those data numerous enough, and also that the instrument in question had a very wide distribution.

Another interesting circumstance is that the more perfected syringes — those that we Europeans formerly copied — did not originate from any of the culture areas in western South America or Central America but from tribes of the Amazonas region.

Broadly speaking, there are in America two types of enema syringes, viz, one with a bulb and the other without. The bulbless type is known from N. W. North America to the

Chocó in Colombia, and the bulbed one from large tracts of South America. The bulbless type is occasionally more or less funnel-shaped, and in some cases at least the clyster is blown by the mouth through the tube into the body. This is mentioned, e. g., from Nicaragua at the time of the Discovery. From the Chocó Indians an enema tube of this type is here depicted, fig. 20. In South America the enema bulb may be either of a bladder or of leather, (fig. 74), or of rubber (fig. 4). Those made of skin or leather are found in western South America and Guiana, the rubber ones in the Amazonas region.

For medicinal use enemas are mentioned from the Quichua, Jivaro and Chocó; from Indians in Nicaragua, Aztecs in Mexico, San Carlos Apaches and Bella Coola. Among a number of tribes where the purpose of enemata-giving is not definitely stated, the writer presumably implies medicinal application or else is ignorant of the exact use.

In eastern Ecuador the Indians cure an unpleasant intestinal complaint with enemata. In this disease, Karsten says, the intestine becomes infested with worms and the patient generally succumbs. The clysters that the Canelos Indians use are composed of so-called Spanish pepper and certain other strongly antiseptic herbs which are supposed to kill the worms before they have had time to gain too much of a footing. This story about the worms I am, however, afraid that the Indians have gulled Karsten with. It is probable that the disorder referred to consists of an exceedingly severe form of dysentery. I am not sure whether Professor Karsten looks upon this disinfecting enematic injection as practical medicine or as a magic rite. Whatever his opinion as to this, a laxative may of course be magical from an Indian point of view, but if it is effective it is nevertheless a genuine laxative. And the same of course applies to a disinfectant enema.

According to what I have been told by Karsten, the enema syringes that the Canelos use consist of a tube with the blad-

der of a fowl. Many Indian tribes manufacture their enema syringes from a rubber ball into which is fixed a tubular mouthpiece made of bone. The rubber ball is made by the Indians in this way that they first shape clay into a ball which they then give a coating of rubber juice, and allow the latter to coagulate and set. Then they cut a hole in the rubber skin and wash out the clay. In the rubber ball a bone mouthpiece is fastened, and special care is given to make the joint perfectly tight. Instead of a rubber bulb some indians, as mentioned, use a bladder of thin leather or skin, and a wooden mouth tube. Two enema syringes of this kind, with skin bladders, were discovered by me in a man's grave in the Ollachea Valley in eastern Peru (fig. 21), and it must be admitted that this is a strange sort of equipment for that man to have been fitted out with for his journey to a better world. In Amazonas the Indians appear to have used, and are still using, the enema syringe chiefly for administering intoxicant clysters. Many Indian tribes prepare a sort of snuff from the seeds of a leguminous plant, Piptadenia, which they blow into their own or other people's nostrils through a pair of tubes made of bird-bones or, occasionally, by means of a small syringe. Parica, as this snuff is generally called, has a strongly intoxicating effect.

Certain Indian tribes on the upper Amazon do not, however, content themselves with merely snuffing parica but have hit upon the extraordinary idea of employing this intoxicant in the form of a clyster, for the injection of which they use a small rubber syringe of the type I have mentioned, and this would appear particularly effective. After about five minutes it acts in about the same way as intoxication from opium, inducing lovely and blissful dreams. Twenty minutes later the dreamer is fully normal again, and does not appear to suffer from any after-discomfort as is the case after snuffing parica. Certain Indians are said to be so addicted to this vice as to always be carrying an enema syringe about with them so that they, at any time they feel inclined, are able to

transport themselves to the land of happy dreams. It is especially at feasts that the Indians use parica, and it is stated that on such occasions an obliging host will distribute enema syringes to all his guests. The height of courtesy, indeed!

It would be of interest to find out whether the Indians have known how to perform operations during the state of anesthesia thus brought about. Very remarkable is the discovery, above referred to, of two enema syringes in an Indian grave in the Ollachea Valley, as trepanned skulls are of very common occurrence in similar graves in that district — and the question arises as to whether there may not be some connection between the enema syringes and trepanning.

Eric von Rosen has attempted to explain certain objects that he and others have discovered in northern Argentina and northern Chile as being tubes of enema syringes, and I believe that his explanation is correct. Von Rosen describes from Puna de Jujuy a small and beautiful wooden tray exactly resembling those used by the Mauhé Indians in the neighbourhood of Rio Tapajos for grinding parica snuff on. It is possible that this tray is connected with the nozzles, and that also in Argentina enema syringes were used for administrering intoxicating clysters, seeing that in that region was known a plant with properties resembling those of parica, and also taken in the form of snuff, like the latter.

After all, the Indian invention of the rubber enema syringe is most remarkable, and strange, as we have seen, is the use it was put to. It was through the Portuguese that other Europeans, and the Chinese too, got to know the rubber syringe; the vicious parica habit has of course not spread over to us, and among the Indians it is strongly on the wane.

It happens that in the Gothenburg Museum there is a clay vessel which possibly represents a man with an enema syringe between his hands, fig. 2. I have told Dr. Tello, the director of the National Museum at Lima, of this strange earthenware figure, and he was quite pleased as he possesses

a similar object in his museum, and he seemed to be convinced that my explanation may be correct.

Birket-Smith, in a circumstantial exposé,[1]) has adduced quite a number of facts in support of his theory that the predecessor of the tobacco pipe was the sucking tube, or else the blowing tube of the medicine men. I am inclined to suggest that the tube of the enema syringe, by means of which the medicine man blows the clyster into the body of the patient, is nothing more or less than such a tube. Olbrecht[2]) writes about the blowing tube from the Cherokee Indians: "It is used to blow or spray the medicine, which the medicine man has

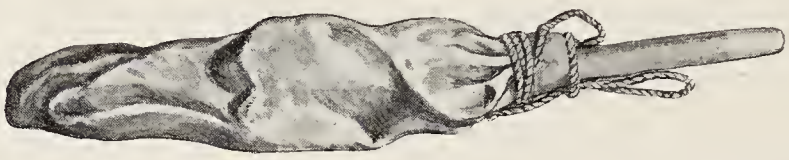

Fig. 74. Jaguar-bladder enema. Pomeroon River. (After *Roth*).

previously sipped from a dipper, over the patient's temples, the crown of his head, his breast, or whatever part of his body that is under treatment".

Olbrecht does not mention that the Cherokee use tubes for administering enemas, but on the other hand he says it is possible that formerly tubes of this description were used for injecting some decoction into the urethra. He writes: "There is a faint indication that till a couple of scores of years ago, occasionally a grass stalk was used to blow a decoction of plants into the urethra. . . The sucking tube, the tobacco pipe and the enema tube would seem to belong to the same complex of inventions. Originally all of them formed part of the medicine man's equipment.

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[1]) Kaj Birket-Smith. Drinking tube and tobacco pipe in North America (Etnologische Studien, Leipzig 1918.)

[2]) Olbrecht Frans M., Some Notes on Cherokee treatment of disease. Janus 1929.

Map 1. Distribution of enemas.

● Syringes.

■ Enema-tubes.

TABLE TO MAP 1.

The Syringe.

Number on the Map	Tribes	Authors or Museum numbers
10	Araucanians	MEDINA, p. 253. "Llamaban *hueuchu* a la vejiga que les servia para el caso." FEBRES Gramática etc.
		LATCHAM, p. 352. "The gatuhue, or syringe used for clysters, composed of a bladder and bone tube."
		GUSINDE, p. 199. "Para lavativas usaban: el quinchihue el vollén el uñoperquen; y para hacer estas ayudas (= lavativas) se servían casi siempre de la vejiga urinaria de un animal, la cual llamaban: pafedkon."
18	Quichua	BOLLAERT.
		NORDENSKIÖLD, (1) p. 32.
34	Jivaro	KARSTEN, p. 210. "I have heard the tropical disease in question mentioned from Matto Grosso in Brazil, where it is known under the name of 'corrupción'. It is also known to the Cañelos Indians at Bobonaza, who maintain that it is curable if strong remedies are immediately resorted to. The Indian treatment consists of a clyster prepared from Spanish pepper and certain other strongly antiseptic herbs which are said to exterminate the worms before they have time to spread too much."
42	Caripuna	HOVORKA and KRONFELD, T. 1, p. 237, fig. 116. "Spritze aus Vogelknochen und Gummi mit welcher berauschende Klistiere aus dem zerstossenen Samenkörnern des Angikobaumes (Pariká) verabreicht werden, gemischt mit Wasser und Asche des Imbuavabaumes." See also HORWITZ, p. 181.
68	Omagua	DE LA CONDAMINE, p. 76. "Les Portugais du Para ont appris des *Omaguas* á faire avec la même matiere des pompes ou seringues qui n'ont pas besoin de piston: elles ont la forme de poires creuses, percées d'un petit trou a leur extrémité, ou ils adaptent une canule. On les remplit d'eau,

Number on The Map	Tribes	Authors or Museum numbers
		et en les pressant, lorsque'elles sont pleines, elles font l'effet d'une seringue ordinaire. Ce meuble est fort en usage chez lez *Omaguas*. Quand ils s'assemblent entr'eux pour quelque fète, le maître de la maison ne manque pas d'en présenter une par politesse à chacun des conviés, et son usage précede toujours parmi eux les repas de céremonie." Veigl, p. 86—87. "Das Mannsvolk bildet aus gewissem ganz besonderem Harze, auf peruanisch Cauchu, (Kautschu) einige hohle Kürbschen, mit an die Mündung angefügten dünnen Röhrlein Diese Plutzergen oder Kürbschen, bleiben immer sehr biegsam, und wenn man sie so zusammen drücket, dass die Luft völlig heraus muss, das Röhrlein aber sodann in etwas flüssiges hinein hält, säuft sich damit das Plutzergen von selbst ganz voll an. Drücket man es alsdann wieder mit der Hand, so läuft das eingesogene nach Maas der drücken, den Gewalt, gleich einerSpritze sehr weit hinaus. Dergleichen Hartz, weil es immer so biegsam, könnte zu verschiedenem Gebrauche, zu Regenschirmen, Feuerspritzen, ja wohl auch zu Stiefeln u. d. gl. sehr nützlich seyn; dort aber hat es keine andere Bestimmung, als zu ein und anderer Clystierspitze; sonst haben auch Omaguas ganz kleine solche Plutzerchen, den Staub des Guruppapulvers damit in die Nase zu schnupfen."
219	Chocó	G. M. 27. 27. 482.
223	Mainas	(Maroni) Noticias autenticas p. 424. "El caucho, ques una leche crasa que sale de la cortesa de un arbol deste nombre. Sacada al sol se pone negra y al modo de un cuero flexible, á que los indios, aplicandole unos moldes de arena y barro, le dan varias formas de frasco, vejiga que llaman taputarana y suple las veces de la Chiringa y otras semejantes." Chantre y Herrera, p. 99.

Number on The Mab.	Tribes	Authors or Museum numbers
381	Cacharary	MASÔ, p. 99. "Cada velho está munido de um saquinho de borracha contendo o tal liquido meloso e de uma pequena seringa feita de caucho e canella de Jacamy, que injecta na quantidade de uma colher de sopa. O effeito é rapido; passados uns cinco minutos, o indio velho começa a contorcer, agita-se, varia, adivinha e, como que influenciado pelo opio ou morphina, sonha, idealizando scenas maravilhosas ou combates encarniçados. Ouve os toques das buzinas e presente o inimigo avançando lá pelas bandas do nascente, já atravessando os igarapés nos seus dominios. E' uma crise de quinze a vinte minutos, passada a qual o indio acorda e volta ao seu estado normal. Esta *ceremonia* é repetida na toda durante os dias da festa, e o Tuchana, depois de estudar todas as revelações dos indios narcotizados, tira suas conclusões, que são communicadas a todos os presentes como tambem as respectivas providencias e . . . a festa continúa. Todos os indios velhos da tribu estão viciados com o uso desse narcotico que mencionamos, pois andam sempre munidos de uma porção do mesmo e da competente seringuinha, afim de se embriagar á vontade e em qualquer logar que lhes appeteça."
A	Coast of Peru	G. M. 21. 7. 27. fig. 1. L. VELEZ LÓPEZ after UHLE (1), p. 77.
Not on the Map	Northern Argentina and Northern Chile	v. ROSEN, p. 150—151.
3 p	Mauhé	HORWITZ, p. 181.
G	Finds in Chulpas	R. M. 06. 1. 489—06. 1. 490. NORDENSKIÖLD, (1) p. 32.
1 S	Mura	JOÃO BARBOSA RODRIGUES. Exploração dos Rios Urubú é Jatapú. Rio de Janeiro 1875, p. 25—26. "Começa a festa por uma flagellação, em que dous indios se fustigam mutuamente com galhos seccos,

Number on the Map	Tribes	Authors or Museum numbers
		ou chicotes feitos com couro de anta, peixe boi ou veado. Outr'ora amarravam na ponta uma pedra ou outra qualquer cousa que ferisse. Emquanto um fustiga á vontade, o outro de braços abertos, recebe as chicotadas esperando a vez de passar de paciente a algoz. Dura esta ceremonia ás vezes seis dias, conforme o numero de rapazes que tem attingido a virilidade. A noite todos os que foram açoutados, toman o paricá ou aspirado em pó, ou dissolvido n'agua em clysteres. No meio das danças, as velhas que preparam o paricá, enchem um tubo de taboca de pó, passam-o a um dos dansantes; este applica uma das extremidades do canudo em uma das ventas de um companheiro e sopra pela outra, ou recebe uma seringa de borracha cheia de paricá dissolvido em agua fria e no meio da dansa applica o bico da seringa no companheiro fazendo desapparecer todo o liquido. Quér de uma, quér de outra fórma, os effeitos são horriveis; e são tão violentos que muitos morrem suffocados a dansar. Pelos esteios da ramada dependuram, arcos e mólhos de flechas para aguelles, que suffocados pelo paricá, não podem continuar a dansar, passeiarem pelo terreiro com estes instrumentos. Geralmente o effeito de clyster é produzir uma embriaguez feroz."
7 S	Arawak Pomeroon and Moruca Rivers	ROTH, p. 705. "The first mention of enemata is made by Barrere from French Guiana, though he believes this practice to have been learned from the Portuguese and English. There are nations toward the Amazon who use an injection with syringes (fig. 4) or a kind of ball made from the milky juice of a tree (sec. 23), which they boil and then pour into molds made of clay kneaded with sand (PBA, 139—140, 205). Dance mentions these articles as apparently known to the British Guiana Indians (Da, 334—339), while even at the present time they are of very com-

Number on the Map	Tribes	Authors or Museum numbers
		mon use on the Pomeroon and Moruca Rivers, where they are made from the bladder of the turtle, jaguar, sloth, and larger mammals attached to a reed nozzle (fig. 341). The Arawak speak of them as akkesoa-hu. There are thus apparently equally as good reasons to consider them of indigenous origin."
0 1	San Carlos Apaches	HRDLIČKA, p. 233. "Occasionally for pains in the bowels they use clysters pouring the decoction through a hollow reed into the rectum and preventing its exil by means of a wad of cotton."
0 2	Indians Nicaragua	GOMARA, (2) p. 283. "Curan viejas los enfermos, que asi es en muchas islas y tierra firme de Indias, y echan medicinas con un canuto tomando la decocion en la boca y soplando. Los nuestros les hacian mil burlas, desventeando al tiempo que querian ellas soplar, ó riyendo del artificio."
0 14	Bella Colla	BOAS F, p. 423. "Enemata of shark oil or olachen oil are given by means of a kelp tube with a mouthpiece made of the wing-bone of an eagle."
0 20	Azteks	SAHAGUN, p. 300. "La enfermedad de la colica pasion será bueno curar con el Ollin mezclado con el Tequisquite y el Ulli y Chille, y haciendo algunas calas de esto y poniendolas al enfermo, con las cuales echará lo que tuviese en el estómago, y hará camaras." "Para la enfermedad de la vexiga, molerse han estas raices aqui nombradas, y el agua de los polvos que se sacase se ha de beber y revolverse tambien en el cacao ó en el vino, pero será necesario primero que beba esta agua, que sea el enfermo xeringado con los polvos de la raiz que se llama Cacamotic; ó beberá el agua del palo Yztacquavitl, que se usa on Quaultitlan; ó beberá el agua de los polvos de la cola de cierto animalejo nombrado Tlaquatzin, que sea un poco de la cola del macho y otro poco de la hembra, todo mexclado; ó beberá el agua de la raiz nombrada Yztacaxixpatli, y esto en vino."

Number on the Map	Tribes	Authors or Museum Numbers
031	Indians Prov of Huxitipa, Mexico	PRIMERA RELACION, ANÓNIMA, p. 295. "Sale desta provincia de Huxitipa un rio grande que pasa por Pánuco é sale á la Mar del Norte, el cual es puerto. Estará Panuco de la Mar del Norte trece leguas poblada: . . . cuando están en sus borracheras é fiestas, lo que no pueden beber por la boca, se lo hacen echan por bajo con un embudo."
Not on the Map	Region of Cañar	UHLE, (1) p. 77.

APPENDIX 2.

On the history and geographical distribution of bee-keeping by the American Indians.

It is a fact not very widely known that bee-keeping occurred in America at the time when the New World was discovered. Passing mention is made of it in certain ethnographical handbooks. I have seen no synopsis of references to Indian bee-keeping contained in the literature on America, and yet such a compilation would not be devoid of interest. Neither do I think it has been sufficiently realized of what great importance wax has been, and still is, to the Indians of tropical America.

In the literature of the Discovery it is natural to find that interest was taken in bees and wax, because in the early part of the 16th century wax was very valuable as an illuminant. Honey, too, was in those days an article much more in request than nowadays, seeing that it was almost entirely doing duty for sugar, which was scarce and costly. When later on sugar cane began to be cultivated on a large scale, honey lost in importance, and the interest for bees waned. Even among many Indian tribes honey is now replaced by sugar-cane juice.

Most of the wax and most of the honey the Indians naturally obtain from wild bees, and of what the latter mean to the Indians there are many references in the literature. Personally I have had much opportunity of observing the extent to which the collecting of wild honey is and was of importance to Indians, more particularly those living in El Gran Chaco.

In America there are wild bees occurring in large communities, especially between the tropics. They belong to the family of Meliponidae. In North America north of Mexico the Indians do not seem to have any use for wax, and American honey-making bees are there rare. Even within the tropics, bees producing wax are not found in the highlands of the Andes nor in the islands of the West Indies. In Chile are found wild bees fairly productive of honey, but wax is not used to appreciable extent.

A thorough study of the Meliponidae species of bees found in southern Brazil has been made by v. Ihering. He points out that all those species of bees from which the mestizo population of Brazil obtain wild honey are still known by their Indian names which often are strikingly characteristic. As a curiosity may be mentioned that the Indians do not speak of bees as being industrious, as we do, but that to them they are symbols of watchfulness. The Tupi Indian word for bee is *iramanha*, which is composed of *ira*, honey, and *manha*, watch.

Typical of these bees, as well as of most species of bees occurring in tropical America, is the reduction and impotence of their sting.

The honey produced by these bees is particularly fine-flavoured. According to v. Ihering, the honey taken from most of the Melipona species is of a quality equalling that which we Europeans obtain from ours, and even better. As far as my own experience goes, I found the honey that I have eaten among the Indians — it is generally served mixed with water — is very palatable, though sometimes slightly acidulous in taste. There is this peculiarity about it that, unlike the honey from our bees, it does not crystallize when kept for some time. A common practice among the Indians is that of allowing watered honey to ferment, from which a slightly intoxicating drink results.

The honey from certain bee species is unfit for use, and, according to some writers, there is even honey that is poison-

ous. Eating of such honey, even in small quantities, causes severe vomiting and convulsions. From the Guarayuindians in Bolivia there is reported by Cardus[1]) a poisonous kind of honey which is very successfully applied as a remedy against paralysis. There is honey that acts as a strong aperient, and even honey that is intoxicating.

Fig. 75. Mixtek house with bee-hives. Mexico. After STARR.

Some bees' nests yield quite a fair amount of honey, say from one half to two litres. Nests of one of the more important species of Melipona nigra is said to yield even up to 10—15 litres of honey (v. Ihering).

All wax I have seen among the Indians of different parts of America was of a very dark colour, often nearly blackbrown. This also applies to all wax we have in our Museum from different part of America. Light-coloured wax also occurs, but seems to be very rare. The Indians themselves

[1]) p. 416.

have never taken any special interest in it except as an article for trading to the whites. Wax that is very dark or black is very difficult to bleach, and I have never seen Indians making any attempts at bleaching it. Some of the wax that is obtained from Indians is largely mixed with resin.

Collecting honey and wax from wild bees often proves a laborious process when the nests are located inside the stems of very hard-wood trees. It may well be questioned whether, among such tribes as do not cultivate the ground or possess vessels made from dug-out tree stems, the most important use to which stone axes were put was not the cutting of holes in tree trunks in order to get at the palatable honey and the useful wax. This is applicable to such tribes as, e. g. the Guayaqui Indians who roam the primeval forests of Paraguay and possess stone axes but no cultivations. The Tsirakua Indians of the northern Chaco are addicted to stealing iron from the whites whenever occasion offers, and from the most inappropriate things, such as wagon wheel cotter pins, they will make chisels of sorts, by means of which they chip out an aperture in the tree stems and thus gain access to the bees' nests. Their country being abundant in wild bees, honey must to them be an important article of food, and those chisels make easier their struggle for existence. The Guayaqui Indians, above referred to, use long-handled brushes of shaving brush type which they are able to eat the honey out of a nest without having to do any cutting to the tree stem. Such eating brushes for honey I have seen in common use among the Ashluslay Indians. This reminds me of a story told by Gumilla, an 18th century Spanish Jesuit . He says that when a certain kind of monkey is unable to insert its arm into a bees' nest it puts its tail through the entrance, dips it into the honey, and pulls it out and licks it clean.

That bees' nests in hard tree stems may be difficult of access is illustrated by the following legend told me by a

Cavina Indian of Rio Beni in Bolivia. A woman climbed a tree to gather honey for her little boy who was clamouring for sweets. She put her arm into a hole in the tree where there was a nest, but got stuck and could not free herself. Eventually she was found hanging there dead, as she never had succeeded in getting her arm out. That something of the kind may actually have happened is quite conceivable.

Indians often have to travel long distances in order to find the wild bees' nests. They will take an almost incredible amount of trouble. It is said of Indians that when they are out to find a bees' nest they will for hours on end follow a single bee until it flies home to its nest and thus reveals to its pursuers where to find the honey and the wax. For most Indians who are not covering a lot of ground in their wanderings it no doubt constitutes a lucky incident when they happen upon a nest, while to a settled population of any size wild honey cannot be of any greater importance, and wax would be difficult to obtain for the various purposes required. I have accordingly found, in my personal experience, that among most Indian tribes wax is looked upon as a fairly costly article. It is therefore not so very remarkable that the Indians have taken up bee-keeping so as to secure to themselves a supply of honey and wax. In looking through the literature on the Indians of America we shall there find fairly frequent references to starts being made at bee-keeping and even to such cultivations carried on really extensively. We shall find that most of this information dates from the early portion of the era of the Discovery, that is to say from the 16th century, when the Spaniards found the Indian cultures at the height of their development. Like so many other things, bee-keeping died out, or lost in importance, when the Indian cultures were shattered by the conquerors. That the importance of Indian bee-keeping has in modern literature not received the attention it deserves is a matter connected with the above. Thus it will be seen that bee-keeping by the Indians has vanished, or waned under

the white men's influence, and that the latter in very few cases have contributed to its being resumed by the Indians, a measure that perhaps would prove of economical value to them, at any rate in certain regions. Bee-keeping is nowadays, as we know, pursued on a large scale in the United States and also in Chile, but it is a business of the whites only and the bees cultivated are of European varieties. In the tropics it is presumably only in the highlands that European bees would stand the climate. Thus in the highlands of Guatemala there occurs cultivation of European bees.

First attempts at bee-keeping occur among many Indian tribes where entire nests are brought home from the forest and hung up outside the walls of the huts. This is mentioned from, e. g. the Makuna Indians of northwestern Brazil and from the Apapocuva-Guarani of southern Brazil.

Ambrosetti states that when Caingua Indians find a bees' nest in the forest they do not rifle it completely with the intention that the bees shall not desert it. They also repair what damage may have been done to the entrance in the taking of the honey. All this is incipient bee-keeping, but the Indians no doubt cultivated bees already in pre-Columbian times and are still carrying on real bee-keeping, i. e. they do not contend themselves with merely fetching home nests from the forest but are keeping the bees next to their huts in hives specially made for the purpose. A bee-hive of this sort, consisting of a calabash with one opening for the bees and another for taking out the honey, is depicted by Roquette-Pinto from the Paressi Indians of Matto Grosso. It is, however, the only true bee-hive I have seen depicted from modern Indians of South America and it might therefore be suspected that the Paressi Indians have learnt from the whites to use such bee-hives. Nevertheless, this does not seem probable, for Oviedo y Valdes speaks as early as the 1540's, on the authority of Rodrigo de Bastidas, of bee-keeping proper in Venezuela. Bishop Bastidas relates to Oviedo how there the Indians had in their huts tamed bees in hives made from large

calabashes, i. e. in the identical manner of the Paressi Indians. Of the bees it is stated that they were smaller than the Spanish kind, and hairy. They had no sting. The honey cells were as big as acorns. Thus there can be no manner of doubt that bee-keeping in its proper sense was carried on in Venezuela at the time of the Discovery. It is probable that it was some Melipona species that the Indians of Colombia and Venezuela had domesticated. Of great importance was apparently the bee-keeping carried on by the Indians of the neighbourhood of Santa Marta in Colombia. In the 1590's it is related by a soldier that he had there seen more than 80,000 bee-hives. For this purpose the Indians used clay vessels. Even if the number may have been exaggerated, it is evident that the Indians of this district of Columbia cultivated bees very extensively. It will be the business of future archaeologists to discover such clay vessels as were used for bee-hives.

From northern South America I have only in one instance found mention of Indian bee-keeping proper in modern times. It is from the Menimehé Indians on Rio Yapura, and of them Whiffen states that they construct bee-hives of hollowed tree stems for swarms to occupy, and these hives they keep inside their huts so as always to have on hand a supply of honey and wax. As these Indians organize the swarming into hives made by themselves, they must of course be said to carry on proper bee-keeping.

If we turn to Central America we find many instances of Indian cultivation of bees. Thus Professor C. V. Hartman observed that the Aztecs of San Salvador kept two species of bees, one as large as the common house fly and the other the size of a mosquito. These they hade domesticated and housed in hives consisting in small gourd shells, hung up on the walls of their huts. It is noteworthy that also in this case the Indians made use of calabashes for bee-hives.

From Yucatan there is mentioned the cultivation of bees, as early as could be desired. When in 1519 Cortez landed

on the island of Cozumel he found that the Indians possessed thousands of bee-hives. Those cannot very well have been nests casually brought in from the forest. These hives are also mentioned from Grijalva's visit to Cozumel in 1518.

From Chitemal (Campeche) where the Mayas pursued cultivation of bees on a large scale, Oviedo describes in detail the bee-hives which here took the form of wooden cylinders, elegantly carved and bearing the private mark of respective owners. These hives lay flat on the ground. The wooden cylinders were the length of a man's arm and as thick as a man's waist, whilst their walls were thin as the width of a little finger. The ends were stopped up with stones and then made tight with clay. There were also, of course, apertures for the ingress and egress of the bees, as well as an arrangement for extracting the honey.

How important bee-keeping was to the Indians of Yucatan is best understood from Bishop Landa's reports of the regularly occurring feasts among the Mayas. Those festivals, which were accompanied by numerous offerings, even including human sacrifices, had among other things for their purpose the conciliation of the gods in order that they might bestow ample harvests, good hunting and fishing and an abundance of honey. During the month of Tzoz the owners of bee-hives made their preparations for celebrating the festival of the month of Tzec. Although fasting was the most important of the preparatory observations it was only compulsory in the case of the priest and his assistants (*chaces*); for the rest of the celebrants it was optional. When in the following month the festival came round they all met up at the house where the celebrations were to be held, and then they proceeded like at other feasts, only that no blood was shed. The gods of the bee-keepers were called Bacabes, and among them Hobnil was the principal one. Large offerings were made, especially to the four *Chaces*. Four plates were handed over, and in the centre of each was placed a ball of incense around which a circle was painted in honey, as it

was with the object of securing plenty of honey that these rites were performed. In the usual way this feast was finished up with wine (honey beer), and those taking part in it drank a great deal, for the bee-hive owners had brought honey in large quantities as their contribution. In the month of Mol the bee-keepers held another festival which was to invoke the gods to provide a plenteous supply of flowers to the bees.

From modern times we can read of bee-keeping in Guatemala in the works of Sappers and Stolls, respectively. The latter is however of opinion that cultivation of bees was here first introduced by the whites, which obviously is incorrect.

Cyrus Thomas has attempted to interpret part of a Mayan manuscript, the Codex Troano, as being a calendar for bee-keepers. The insect there depicted being more like a beetle of some kind, this explanation has been called in question.

Also as regards Mexico there are reference to apiculture dating from the early part of the 16th century, from the province of Xalisco whence Oviedo gives a detailed description of the bee-hives and the method of emptying them of the honey. He says that the bees were the size of the common house-fly and that they had no sting. For bee-hives were used hollow logs which were hung up inside the houses. These contrivances were provided with a special aperture through which the combs could be taken out without damage to the hive or disturbance to the bees. Part of the honey and wax was used in the household and part employed in barter.

From modern times Indian bee-keeping is mentioned by Starr from the Mixtecas. From there he also publishes two interesting pictures, one being of a Mixteca hut outside which bee-hives are suspended (fig. 75), and the other of a shed especially built for the hives. The hives are constructed of sticks tied together and wrapped up in mats.

We have seen that at the time of the Discovery bee-keeping was extensively carried on in Mexico, Yucatan, Colom-

bia, and in Venezuela on the Colombian border, or, in other words in regions where the Indians were of a really high culture. As regards Peru, that is to say the Inca kingdom, there is however conclusive evidence of bee-keeping there having been unknown.

That the Indians have themselves, i. e. entirely independent of influences from the Old World, hit upon the idea of domesticating bees is of course quite evident from the fact that in America there are still found different stages of evolution of this quaint domestic animal rearing. There is no question of bee-keeping possibly being a Malayo-Polynesian cultural element seeing that this cultivation is unknown in Oceania.

The annexed map 2 shows that in America bee-keeping most probably originated within the Central American civilization area, and thence spread to South America.

Map 2. The geographical distribution of bee-keeping in America.

■ Proper bee-keeping.

□ Nest of wild bees brought home from the forest and kept in or near the huts.

TABLE TO MAP 2.

Bee-keeping.

Number on the Map	Tribes	Authors
48	Makúna	KOCH-GRÜNBERG, (1) Vol. II, p. 291. "Seltene Haustiere" fanden wir in der Makúna-Maloka. An einem Hauspfosten war in einer Höhe von etwa zwei Metern ein Stück eines hohlen Baumstammes mit Stricken festgebunden, ein Bienenstock. . .
61	Menimehe	WHIFFEN, p. 51. "The Menimehe, whose houses are more open, make hives of hollow trees for bees to swarm in, and these are placed in their maloka, so that a store of honey and wax is always at hand."
87	Mestizos, East Brazil	v. IHERING.
227	Apapocúva-Guarani	NIMUENDAJÚ, p. 340. "In der Linie der offenen Front stehen: ein Baumstumpf mit einem Nest der Jatei-Bienen, deren Honig bei den religiösen Handlungen, nächst dem der Mandasáia, am meisten bevorzugt wird."
313	Indians, Venezuela	OVIEDO, T. II, p. 331. "Abejas hay muchas por los bosques salvajes . . . Algunas crian los indios en sus casas en unos calabaços grandes: no pican ni tienen ponçoña, é son mucho menores que las de España é mas vellosas: y los vasillos de los panales, aunque las abejas son pequeñas, como he dicho, son cada uno tan grande como una bellota." (After RODRIGO DE BASTIDAS).
382	Negroes, Pearl Islands	NORDENSKIÖLD (4).
388	Valle de Caldera near S:a Marta	SIMON T. V, p. 192. "Decía un soldado que había visto en un colmenar en aquel valle más de ochenta mil colmenas, y era que las casas eran diez mil, y en cada una habia de diez para arriba; eran unas ollas grandes ó múcuras donde hacían su miel muy dulce, por ser de flor de guamos, unas abejas pequeñuelas, no en panales, sino en bolsas grandes de cera, y olía á la flor."

Number on the Map	Tribes	Authors
5 C	Paressi	ROQUETTE-PINTO, p. 13, fig. 3, and p. 341.
o 3	Indians, province of Xalisco in Mexico	OVIEDO, T. III, p. 561. "É su segunda grangeria é muy ordinaria es criar colmenas, é tiénenlas en las casas colgadas en el ayre; y en lugar de corchos (que no los tienen), para los vassos de las abejas toman un troço de árbol é háçenlo vacuo, del tamaño é proporçión que en España lo hacen de la corteça del alcornoque; y en una casa diez y en otra veynte ó treynta, é más ó menos, tienen colgadas sus colmenas, é allí crian sus panales é miel muy exçelente, é tal que la de Cerrato ó de la Alcarria en Castilla, ó la de Caspe en Aragon no le haçen ventaja en buen sabor é color y en todo lo que la buena miel se suele usar. Las abejas son pequeñas é no mayores que moscas, é son muchas, é no pican ni haçen mal, porque son desarmadas. Para sacar la miel, de que usan comer y echar en sus manjares tienen una ó dos colmenas diputadas para gastar dellas ordinariamente (porque las demás están enteras para el tracto é rescate de la miel é de la çera, ques mercaduria de que mucho se aprovechan, é han por ella otras cosas, questos indios no alcançan). E meten por çierto agugero de la colmena, quitando un tapon, un palo liso que para aquello tienen fecho, é por allí destila é sale uno ó dos açumbres de miel ó lo que quieren sacar, sin desbaratar la colmena ni haçerle detrimento ni causar alteraçion á las abejas; é cómo son muchas las colmenas, assi es en grandissima cantidad la çera é muy buena." See also DIGUET p. 438—441.
o 4	Mixteks	STARR, Notes T. VIII, p. 140. "At Yodocono, San Bartolo and other towns, they keep many bees. The bee hives are cylindrical foundations made of sticks tied together, which are then wrapped in matting and hung to the sides of the houses or arranged upon supports over which protecting thatches are constructed. "See also. STARR. Ind. Southern Mex. Pl. LVIII a. b.

Number on the Map	Tribes	Authors
0 5	Yucatan Isla Cozumel	GOMARA, (2) p. 305. "Tienen tambien mucha miel, aunque agra un poco, y colmenares de á mil y mas colmenas, algo chicas. No sabian alumbrarse con la cera." see also: DIAZ DEL CASTILLO, p. 9; OVIEDO T. I, p. 508.
0 6	Azteks, San Salvador	HARTMANN, p. 297. "Två biarter den ena av en vanlig flugas den andra av en myggas storlek, hava aztekerna domesticerat, och man ser dem inhysta i kupor av små pumpskal, som hänga på husväggarna."
0 29	Indians, Chitemal, Yucatan	OVIEDO, T. III, p. 245—246. "Allí hallaron mucha é muy buena miel é colmenares grandes de á mill é dos mill colmenas en troncos de árboles, bien fechos, con sus çebaderos y entradas; y es grande esta grangeria é contractaçion allí de la miel, é no es menos buena que la de Castilla en color é sabor; pero la çera es negra, como açabache. Y es cosa para notar la forma destas colmenas, porque cada una es tan luenga como el braço tendido de un hombre, ó tan gruessa ó mas que por la çintura, y está en tierra tentida é tiene los extremos atapados con una piedra de cada parte, é muy bien embarrada. Por encima é orillas de aquellas piedras entran é salen las abejas por un agujero, que está en la mitad del vaso de la colmena, en la mas alta parte della; é háçia la una piedra, desde la mitad ó desde el dicho agujeró, haçen su labor é panales é sus çeldas é vasillos muy bien ordenados: é de aquellos sale é se destila la miel é va á la otra mitad del vaso é cae en unas bolsas de çera, é aquellas se hinchen della, é la otra cantidad mayor de la çera toda queda á la otra parte de la colmena. E quando quieren sacar la miel é castrar las colmenas o qualquier dellas, desatapan el vaso por aquella parte derecha haçia donde estan las bolsas, y en punçándolas, haçiéndoles un agujero tan gruesso ó delgado, como quisieren que salga el chorro de la miel, assi ella por allí haçe su curso, é viene mucho

Number on the Map	Tribes	Authors
		linda é sabrosa é limpia sin çera alguna, tan purificada, como si la oviessen colado por un muy limpio çedaço. Es cosa mucho para ver é contemplar, é hay grandissima cantidad é tracto en aquella tierra de aquella miel, y espeçialmente allí. Las abejas son en la forma é tamaño como las de Castilla, exçepto que en la color estotras son blancas é muy domésticas, porque ni huyen ni haçen mal; é tomando una é mastrujándola entre los dedos, huele muy bien. El vaso de la colmena, como he dicho, es un troço ó pedaço de un árbol vaquado de dentro, é dexándole entero como una caxa de un atambor, é tan delgado, despues de labrado, como el dedo menor de la mano, ó como le quieren dexar, é por ençima sin corteça é muy bien labrado, entalladas labores é follages de relieve; é cada vaso é colmena tiene esculpida la señal é marca del señor, cuyo es el colmenar."
0 30	Lacandons	SAPPER, (1) p. 193. "Dagegen haben die Indianer, und ihnen nach da und dort auch die Mischlinge, die einheimischen Bienenarten (deren Honig auch im Walde ausgenommen zu werden pflegt) ans Haus."

APPENDIX 3

Quipus.

In their simplified form these devices have a very wide distribution in America, as will be apparent from Map 3 and the Table. Such quipus only consist of cords with knots which are not arranged in any particular way. The knots as a rule signify days, or, more occasionally, months, and they are used to indicate the date of some feast or such like. These simplified quipus are very commonly used in the nature of cards of invitation.

It is only from Peru that more elaborate quipus are known, in which the knots are valuable according to their coordinate placing, this being by the decimal system so that the lowest knots denote units, those next to them tens, then hundreds, etc. These quipus were used for calendary calculations and also for statistics. In them the colours of the different cords also are of importance.

No quipus comparable to those of Peru are known from any other part of the world. The ingenious placing of the knots according to the decimal system must, as I have already pointed out, be an Indian invention. In Oceania, too, quipus are known, as e. g. from the Marquesas Islands, and it is usual to count quipus among such culture elements as the Indians have in common with Oceania. The question however naturally presents itself as to whether the Indians, seeing that they have been capable of inventing the application of the decimal system, have not also been able to achieve that far simpler invention of making a knot on a piece of string for day, or month, that passed, i. e. inventing such

simple quipus as also are so widely distributed outside Peru. The same idea, as we know, is also applied in another way: the Tapiete, for example, every day cut a notch in a piece of wood, a system of recording the passing of the days which is to be found also in other parts, e. g. in Guiana. The Palikur have quaint little "flags" of grass straws. These are

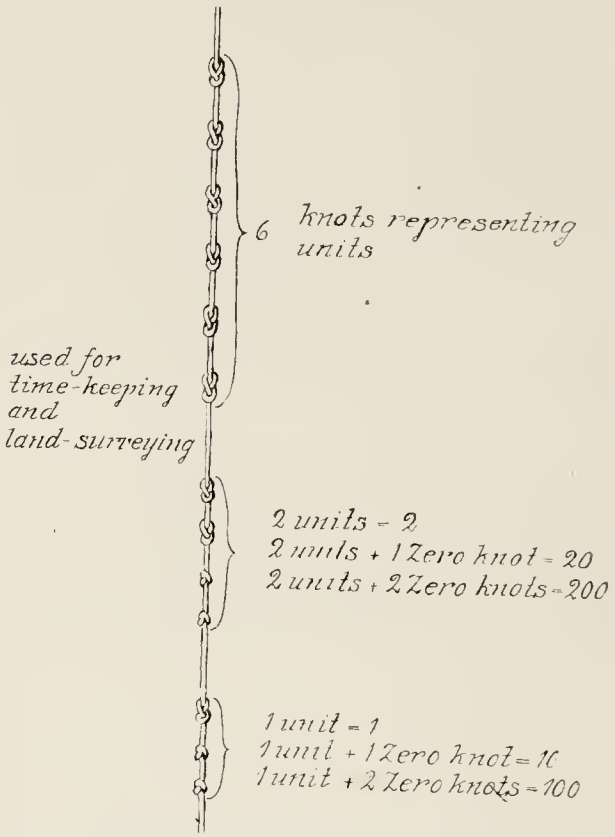

6 knots representing units
used for time-keeping and land-surveying
2 units = 2
2 units + 1 Zero knot = 20
2 units + 2 Zero knots = 200
1 unit = 1
1 unit + 1 Zero knot = 10
1 unit + 2 Zero knots = 100

Fig. 76. Quipu made in Gothenburg by an Araucanian Indian, Bernardino Millaquen, from Renihue. G. M. 29. 24. 1.

used as letters of invitation, a whole straw counting as one day, and half a straw as a half-day. Something very similar has been recorded as early as 1609, by Harcourt (p. 91.) "When they appoint or promise any thing to bee done by a time limited, they will deliuer a little bundle of sticks equall to the number of daies, or Moones that they appoint, and will themselues keepe another bundle of the like number: and

to obserue their appointed time, they will euery day or Moone take away a sticke, and when they haue taken away all, then they know that the time of their appointment is come, and will accordingly performe their promise". Roth (p. 719), who gives a detailed description of the different ways in which the Guiana Indians keep count of days, mentions that instead of knots on a piece of string, occasionally are used glass beads threaded on a cord, or even, e. g., small stones placed inside a calabash.

The point about quipus that in this connection possesses so great a theoretical interest to us is the fact of a very widespread invention having within one of the American culture areas become in such an ingenious manner specialized, thereby evidencing Indian capability for making inventions.

From this it will be seen that quipus are among the culture elements that are common to the Old World and the New, but in the latter have reached a higher degree of development than in the Old World.

The quipu (fig 76) is made by an Araucanian Indian, Bernardo Millaquen, from Renihui who as a sailor visited Gothenburg in 1929. This quipu has a special knot for zero, which probably is a modification under European influence.

Map 3. Geographical distribution of quipus in America.

TABLE TO MAP 3.

Quipus.

Number on the Map	Tribes	Authors or Museum numbers
10	Araucanians	LENZ, Vol. 2, p. 638, "pron, m.-hist. anticuado-los atados de hilos de lana con nudos, que los indios chilenos usaban como ayuda para la memoria en recordar fechas i números. Corresponden a los 'quipus' de los peruanos. Cp. 'quipu'."
		"Un hilo algo grueso, con tantos hilos cuantos han de ser las lunas i en hilos mas delgado a las tantas noches de la postrera luna señalada, con otros tantos nudos; a estos libros los llaman Prones." Jerónimo Pietas, Gay Doc. I 490. El Pron, cada Butanmapu tiene su color señalado para en hilo del pron. Ibid. 491. cp. tb. GUEVARA I. 290."
		POEPPIG, Vol. 1, p. 386. "Unter den Araucanen herrscht die Sitte durch Übersendung von Pron (Schnüre, die in Zusammensetzung und Gebrauch den quipos der alten Peruaner ähnlich sind) die Zahl und art der Dinge anzuzeigen, die man zur Sühne verlangt."
		GUEVARA p. 379.
18	Quichua,	UHLE, (2).
	Modern	GODET, p. 144.
		BANDELIER.
	Quichua, Old.	LOCKE (with references).
		NORDENSKIÖLD (8) (with references).
19	Aymara	NORDENSKIÖLD, R. M. 05. 16. 67.
		BERTONIO.
47	Taulipang	KOCH-GRÜNBERG (2) T. III, p. 155. The knots indicate days.
54	Guahibo	KOCH-GRÜNBERG (2) T. III, p. 155. The knots indicate days.
55	Caribs	BARRERE p. 183. The knots indicate days.
		HILDEBRAND p. 77. It is related of a certain Captain Lorens Brander that (1731) he was paddled up the Barima river where, having as his interpreter a Jew named Hammelberg, he succeeded in getting speech with the natives, eventually

Number ont he Map	Tribes	Authors or Museum numbers
		gaining the friendship of an Indian chief, a "jopotory", who expressed a wish to get into touch with Sweden. He declared that Swedish ships would be welcomed in his country, and sent some presents to the King of Sweden. In parting, as a mark of his friendly disposition he presented Captain Brander with a piece of string, or rope, with twelve knots, saying that the Indian chief expected another ship to pay him a visit within the next twelve month.
126	Saliva	KOCH-GRÜNBERG (2) T. 111, p. 155.
143	Capinas	HERIARTE p. 59. "Contáo por nós, que fazem em cordeis e cada nó he hum anno ou dia, ou o que querem contar."
219	Chocó	G. M. 27. 27. 795, NORDENSKIÖLD (4) p. 164.
357	Caribs, lower Orinoco	HUMBOLDT Vol. 6, p. 285.
371	Bogotá Indians, Panama	NORDENSKIÖLD.
397	Acawoi	SCHOMBURGK T. 1, p. 203. IM THURN, p. 320. The knots indicate days.
402	Coconuco, Pubehanos y Chisquios and other tribes in the same district.	ZERDA p. 16. "Contaban por grupos de á siete, y sus cuentas las llevaban con nudos en unas cuerdas llamados quipos."
7 S	Arawak	SCHOMBURGK T. 2, p. 458. QUANDT p. 254. JOEST p. 94.
8 X	Warrau?	VAN BERKEL, p. 51. The knots indicate days.
A	Coast of Peru	LOCKE, with references. NORDENSKIÖLD (8), with references.
0 21	Mosquito	ROBERTS p. 270.
	Sumo and Mosquito	SAPPER (2). p. 265. "Geht der Indianer aber auf eine längere Reise so hinterlässt er seiner Frau einen Strick mit so viel Knoten als er Tage ent-

Number on the Map	Tribes	Authors or Museum numbers
		fernt bleiben will und die Frau schneidet nun mit jedem Tage einen Knoten ab, um immer über die Zeit der Ankunft im Klaren zu sein. Es ist dies ein Anklang an die südamerikanischen Quipus, wie er im nördlichen Amerika nirgends beobachtet wird."
o 27	Havasupai	SPIER p. 169. "A knotted cord or quipu (*dŭtvu-wádjĭga*) is used to add formality to an invitation to another tribe or in accepting an invitation from them. The cord, which is carried by the messenger, contains a knot for each sleep which will elapse before the meeting. One knot is cut off each night: the last one, which is by itself at the end of the cord, represent the meeting. Thus the Havasupai sent one, made by the reservation policeman, to the Navaho at large by a member of that tribe. This had seventeen knots and referred to a dance held in September 1919. Two instances of quipus brought by Walapai were noted; both invitations of local chiefs to mourning ceremonies. On August 26, 1921, a Navaho, who was not a chief, gave one with ten knots to Supai Jack, a prominent man, with the information that the Navaho would arrive at the Havasupai villiage in the afternoon or evening of September fourth."
		These are not used as memonic devices, nor do they use notched sticks in this way."
o 28	Huichol	LUMHOLZ T. 2, p. 114. "To make it easier to keep in mind, each of them have made a string of palm fibre on which she has made so many knots as lovers she has had. This string she carries to the temple and standing before the fire she tells out all her men she has been making knots for, the one after the other. When she has finished she throws the list into the fire, and then when the God has received it and consumed it in his flame, everything is forgotten and she is purified."
o 33	Sumo	SAPPER (2). p. 265.
o 36	Pueblo	SPIER p. 169.

Number on the Map	Tribes	Authors or Museum numbers
0 40	Maidu	SPIER.
0 41	Miwoc	»
0 42	Walapai	»
0 43	Navaho	»
0 44	Zuni	»
0 56	Chemehuevi	»
0 57	Klallam	»
0 58	Yakima	»
Not on the Map	Interior Salish of Nicola Valley	»
0 60	Nahua	RIVET (3).
0 61	Powhatan of Virginia	»

APPENDIX 4.

Bridges.

To what I have said on p. 48, I here wish to add the following. Anyone who has travelled in those regions of South America where the rivers are unnavigable will know how great the difficulties are in crossing them. One frequently has to go considerable distances along the bank of a river in order to find a fordable place, and at the fords it may prove necessary to wait for days before a crossing is possible. And in many places fording is altogether out of question. The Indians, too, are confronted with similar difficulties. Clumsy attempts at bridge-building are thus met with already among the most primitive Indians. The Sirionó Indians simply stretch a liana across the river, by way of a hand-rail for assisting women and children to wade across. The Botocudos stretch two lianas over the river, one above the other. The upper one then serves as a hand-rail, and the lower one for walking on. Like rope-walkers, young and old alike cross over by it, carrying their burdens. In many parts it is usual to provide a passage over deep but narrow streams by felling across them tree-stems to serve as bridges. As these are generally very slippery, their use is especially unpleasant to anyone wearing boots or shoes. Among the Huari Indians I have seen an exceedingly simplified bridge consisting of a few wooden poles lashed together and provided with a couple of supports underneath. One had to balance-walk along one pole while finding what support could be supplied by a flimsy hand-rail. A bridge of similar kind is mentioned by Roosevelt from the Nhambi-

quara Indians. None of the Indians just referred to, possess any canoes or the like, and it may be questioned whether a great part of central South America was not originally peopled by Indians lacking means of navigation, who therefore made use of bridges for crossing rivers difficult or impossible of fording. Thus they have been restricted to the highlands forming the watersheds between the large rivers which partly must have been impassable without watercraft.

It is obvious that simple bridges, those consisting of lianas or of logs tied together, belong to such culture elements as are found among the most primitive tribes of South America.

Very simple liana bridges are also mentioned from Maynas, and very simple bridges of tied-together poles from Guiana.

From other parts of the Amazonas region where river craft of various kinds are known, no bridges are to be found. Bridges are, however, common in mountain regions within the limits of the ancient Inca realm in Colombia and Central America. In those parts the art of bridge-building, judging by accounts dating from the time of the Discovery or shortly afterwards, had even thus early attained a very high standard. There existed very ingeniously constructed liana bridges as well as so-called "uruyas".

Map 4. Geographical distribution of bridges in South and Central America.

One or two lianas stretched over the river as a very primitive bridge.

More elaborated liana or rope bridges.

Bridges made of poles tied together and generally supported up by other poles.

Floating bridge.

Cantilever constructions and other bridges (not liana bridges) of more elaborate construction.

TABLE TO MAP 4.

Bridges.

Number on the Map	Tribes	Authors or Museum numbers
18	Quichua	COBO Vol. 4, p. 211—212. "La Oroya es una maroma ó soga de *Hicho* ó de bejucos tan gruesa como la pierna, la cual amarran muy tirante de ambas orillas del rio á dos penascos, si los hay, y si no, á fuertes pilares ó estribos hechos de piedras; y á veces viene á estar levantada del agua diez y más estados, conforme á la disposición de sus riberas. Desta soga cuelgan un cesto como de vendimiar, con su asa redonda y arqueada, por la cual entra la maroma, y en él meten al hombre y tiran de la orilla con otra soga delgada que está atada á dicho cesto, el cual va corriendo y deslizándose por la maroma hasta llegar al cabo; y no sólo pasan los hombres en estos cestos, sino también fardos de ropas y cuantas cosas quieren." NORDENSKIÖLD (5) p. 117—118. MIDDENDORF Vol. 3, p. 11.
19	Aymara	Floating bridges. Rio Desaguadero.
36	Kagaba	BOLINDER p. 157. PREUSS (2), p. 12, 19, 129.
45	Botokuds	WIED-NEUWIED, Vol. 2, p. 37. "Nicht zu breite und reissende Flüsse passiren sie auf Uebergängen von Schlingpflanzen, welche sie in jeder Gegend gewöhnlich schon vorher zu diesen Endzwecken angebracht haben. Sie sind sehr kunstlos, und bestehen blos in einer langen, einfachen, etwas schlaff an der Oberfläche des Wassers gespannte Çipó; auf dieser gehen sie mit den Füssen, und halten sich mit den Händen an einer andern, höher ausgespannten. Ueber solche rohe Stege arbeitet sich die ganze Truppe hinüber, alt und jung, mit allem Gepäcke."
47	Taulipang etc.	KOCH-GRÜNBERG (2), Vol. 3, Abb 6.

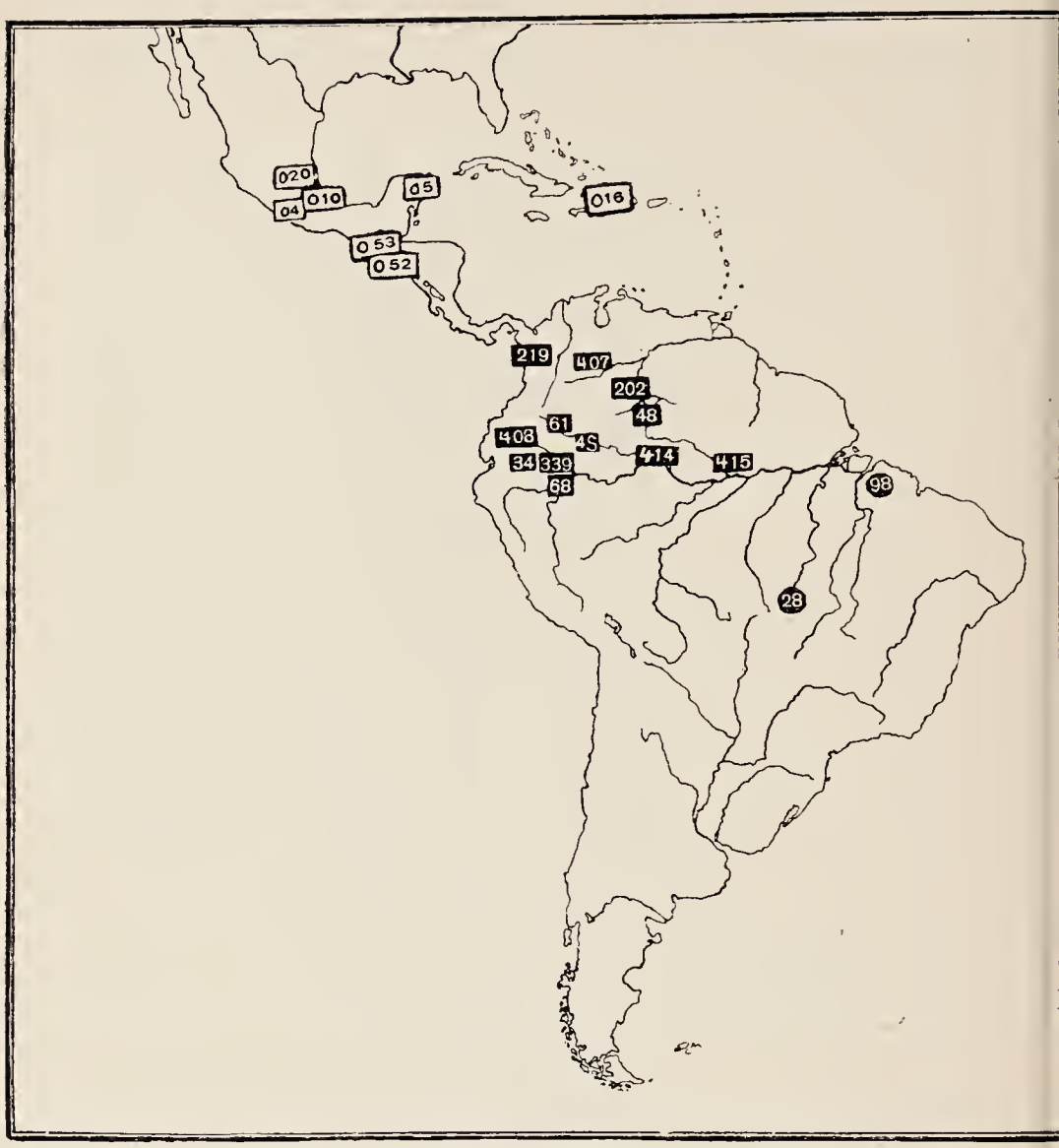
Number on the Map	Tribes	Authors or Museum numbers
51	Siriono	D'ORBIGNY (1), p. 341; see also D'ORBIGNY (2), Pl. 19. "Dans leurs courses journalières, ils ne font aucun usage de pirogues; s'ils ont une rivière à passer, ils coupent des lianes, les attachent à terre à un arbre ou à des pieux, qu'ils placent à cet effet, les enroulant autour des troncs d'arbres arrêtès par les courans au sein des eaux, et formant ainsi une espèce de pont, auquel les femmes s'accrochent pour passer avec leurs familles."
64	Huari	NORDENSKIÖLD (11).
363	Patangoras	AGUADO, Vol. 2, p. 129. "Es tierra de muchas aguas y grandes rios peligrosissimos por causa de su gran corriente y velocidad que la aspereça de la tierra les cavsa, y ansi van tan despeñados que muy pocos dellos se vadean: pasanse por vnas puentes de bexycos, ques çierta manera de sogas o mimbres que la tierra montuosa produce y cria, las quales son muy fragiles y de mucho rriesgo; vanse meneando a vna parte y a otra y ariba y abaxo quando las pasan, y por la mucha fuga que tienen son agoviadas de en medio, de suerte que el arco que auian de tener para arriba, con su fragilidad le tienen para abaxo, y no a de entrar en ellas vno tras otro, sino desque aya pasado el primero, luego entra en ellas el segundo, y si la puente se açierta a quebrar, pocas vezes escapan con la vida los que en ellas se hallan."
390	Region av S:a Marta	SIMON, Vol. 5, p. 189.
391	Near Cartagena	OVIEDO, Vol. 2, p. 454. Lianabridge.
392	Sierra Abibe	CIEZA DE LEON, p. 363. Lianabridge.
	Between Cali and Popayan	CIEZA DE LEON, p. 381. De cañas gordas.
393	Cartago	CIEZA DE LEON, p. 377.
394	Guaharibo	HUMBOLDT, Vol. VI, p. 53.
		CHAFFANJON, p. 311, fig. to p. 308. "Nous passons un premier ratch, puis un second, sept ou huit

Number on the Map	Tribes	Authors or Museum numbers
		kilomètres en amont. Enfin, vers les quatre heures et demie du soir, nous trouvons une espèce de lac avec un rayol, à l'extrémité duquel quelques branches, régulièrement placées en travers du courant, attirent notre attention; plantées entre les anfractuosités des rochers, elles forment passerelle. Pour les constructions de cette espèce, les Indiens attendent que la rivière soit très basse. Ils recherchent des ramures ou de jeunes fûts, d'une seule venue, comme on en rencontre beaucoup dans la forêt. La crosseur varie entre 12 à 15 centimètres de diamètre, la longueur diffère suivant la profondeur de l'eau. Les piquets que nous examinons ne dépassent pas 4 mètres de longueur, ils sont, ainsi que toutes les branches, ou cassés ou brûlés; aucun ne port trace de hache ou de couteau. Les supports en X, disposés de distance en distance, ont les bras réunis par des traverses, tant à la partie inférieure qu'à la partie supérieure. Le tout est solidement fixé avec des lianes très résistantes. Pour mieux assujettir les supports plantés dans quelque aufractuosité ou entre les roches, ou les relie aux arbres de la rive, ce qui leur donne l'aspect d'un pont suspendu. Les Indiens marchent sur les deux traverses inférieures et se servent de la supérieure comme d'une rampe."
403	Provincia de Quixos	HERIARTE, p. 65, "se passam por cima de humas cordas tecidas, a que chamão os naturaes pontes de Guanas."
	Asarunatoas	[MARONI] Noticias autenticas, p. 138, "pues lo era un puente ó pasadizo que usan ellos de un bejuco para pasar á nado de una banda a otra."
410	Ecuador, canton de Guano	VILLAVICENCIO, picture to p. 331. Liana bridge.
		SPRUCE, Vol. 2, p. 219. "At last there is a steep winding descent to the hanging bridge of Penipe, which is formed by cables made of roots of Agave,

Number on the Map	Tribes	Authors or Museum numbers
		4 inches thick, stretched as in an ordinary suspension bridge, and the roadway consists of sticks tied across the cables. These sticks should be flattened and touching each other, but many of them are left in their original rotundity, and they are sometimes wide enough apart for a foot to slip between. The bridge sways to and fro when the wind is high, and oscillates fearfully as one passes over it. It has also become lower on one side, and several sticks are slipping away on that side. A rope is stretched on each side at some height above the bridge; its original intention seems to have been for a hand-rail, but the bridge has so sunk away from them that they can only be reached here and there even by a very tall man."
411	Indians, Sierra de Merida	ERNST p. 193.
412	Indians, Rupununi-river, British Guiana	ROTH p. 610, fig. 334.
	Indios Bravios, Matto Grosso	RONDON, Pl. 1.
1 C	Paez	PITTIER DE FÁBREGA, p. 320. "The Paez Indians are very clever bridge-builders and are often called considerable distances to employ their skill in this direction. I observed three different types of native bridges, two of which were entirely new to me. The more primitive one consists simply of a vine stretched across a river, and crossed by hanging and progressing with the hands and arms. The second type is a frail-looking bamboo structure, the base of which is an arch free in the air, or suspended somewhat like our suspension bridges (plates VII, 2).

Number on the Map	Tribes	Authors or Museum numbers
		The third type of bridge is a much more substantial structure, built of heavy timbers apparently with an understanding of the laws of gravity. On each side of the river a pair of strong beams are built into pillars of stonework, so that the weight upon the immured extremities counterbalances the free ends independently of the supports by which the latter are upheld. Thus solidly fixed, the two pairs are opposite each other with a more or less wide space between their extremities. To span this, the ends of both pairs are first connected by means of transverse ties, inserted between beams and props, the whole being solidly lashed together with vines. On these ties two more beams of sufficient length are laid, which serve to complete the span. The main structure of the bridge being thus formed, a heavy floor, generally of round stems, is laid over it, and the whole is protected by a roof of elaborate construction (plates VII, I, and VIII). It is useless to say that not a single nail is used to unite the numerous parts of the structure, a vine called *ptakuia* being exclusively used for this purpose. We saw two of these large structures, one on the Paez river near Huila, the other on the Moras river, on the trail from Vitoncó to Mosoco. But we were informed that most of the larger rivers in Tolima and elsewhere in the Magdalena valley are bridged in the same way, and that Paez Indians are in frequent requisition elsewhere as bridge-builders."
5 C	Nhambiquara	ROOSEVELT, p. 238. "At one point we found the tough vine hand-rail of an Indian bridge running right across the river, a couple of feet above it. Evidently the bridge had been built at low water. Tree poles had been driven into the stream-bed in a line at right angles to the current. The bridge had consisted of poles fastened to these

Number on the Map	Tribes	Authors or Museum numbers
		supports, leading between them and from the support at each end to the banks. The rope of tough vines had been stretched as a hand-rail, necessary with such precarious footing."
A	Coast of Peru	XEREZ, p. 125. "Otro dia á hora de comer llegó á un pueblo grande que está en un valle; en medio del camino hay un rio grande muy furioso; tiene dos puentes juntas hechos de red, desta manera, que sacan un gran cimiento desde el agua y lo suben bien alto, y de una parte del rio á otra hay unas maromas hechas de bejucos á manera de bimbres, tan gruesas como el muslo, y tiénenlas atadas con grandes piedras, y de la una á la otra hay anchor de una carreta, y atraviesan recios cordeles muy tejidos y por debajo ponen unas piedras grandes para que apesgue la puente. Por la una destas pasa la gente comun, y tiene su portero que pide portazgo, y por la otra pasan los señores y sus capitanes: esta está siempre cerrada, y abriéronla para que pasasen el capitan y su gente, y los caballos pasaron muy bien."
o 26	Mixe	STARR (2), Pl. XCVI.
		STARR (1) p. 153. Typical liana bridge.
o 56	Chajrax, Alto Verapaz	SAPPER. (3) Taf. VII.
	Rio Chixoy	SAPPER (2). Picture to p. 283.



Map 5. Geographical distribution of the gong.
● ■ Signal gongs.
□ Teponatzli.

APPENDIX 5.

TABLE TO MAP 5.

Gong.

Number on the Map	Tribes	Authors or Museum numbers
28	Auetö	MAX SCHMIDT, p. 84. "In der Mitte des Innenraumes befand sich am Boden ein dicker, etwa 6 m langer, ausgehöhlter Baumstamm, der mit einem grossen Holzklotz, einer grossen Trommel gleich, geschlagen wirt, um bei wichtigen Angelegenheiten die männliche Auetöbevölkerung schnell zusammenrufen."
28	Bakaïrí Kamayurá	KARL VON DEN STEINEN, p. 326. "Im dritten Bakaïridorf und bei den Kamayurá wurde als Pauke ein hohle Baum, der auf Erde lag, benutzt."
34	Jivaro	G. M. 20. 7. 76; RIVET (1), p. 39; FARABEE, p. 123. KARSTEN Vol. 2, p. 245.
48	Tariána Tukáno Makúna, Opaina, Yukúna, Matapy	KOCH-GRÜNBERG (1). Vol. 1, p. 276; Vol. 2, p. 53, 291, 303. SPRUCE, Vol. 2, p. 426.
61	Uitóto	PREUSS (1), p. 8 etc., fig.; Pl. 1, fig. 1., FARABEE p. 147. KOCH-GRÜNBERG (1), Vol. 2, p. 303—304.
4 S	Boro	WHIFFEN, p. 214. "In fact, the most remarkable of all the native instruments is the *manguare* or signal drum. Although the primary use of this drum is to signal, it is utilised on great occasions as an addition to the aboriginal orchestra. To make this important adjunct of the *maloka* two blocks of hard wood are chosen, some six feet in length, and about twenty-four inches in diameter. These blocks are very carefully hollowed out by means of heated stones that are introduced through a narrow longitudinal slit, and char the

Number on the Map	Tribes	Authors or museum numbers
		interior. Instead of endeavoring, however, as would be the case with an ordinary drum, to contrive as nearly perfect a cylinder as possible, the object of the signal-drum maker is to obtain a husk of varying thicknesses, so as to secure differences in note. Accordingly, with his rude implements, hot stones, capybara-tooth borer, and stone axe, he fashions the interior of the drum in such a manner that the outer shell, the sounding-board, varies in thickness from half an inch to four inches. Two blocks are used; the smaller is called the male, and the larger the female. The ends are simply the wood of the tree which is not removed, all the hollowing being accomplished by means of the grooved slit. When finished these are suspended by withes at an oblique angle, one end much higher than the other — say six feet and tree feet respectively from the ground. They hang from the rafters of the *maloka*, or from an upright frame, and present the appearance of two barrels surmounted by a narrow slit."
4 S	Miraña	SPIX und MARTIUS, Vol. III, p. 1248—1249. "Schon am Tage nach unserer Ankunft erschienen mehrere *Miranhas* aus den Wäldern, hergerufen durch die Holzpauken (*Trocano*), welche sogleich geschlagen worden waren. Es sind diess nämlich grosse, ausgehöhlte, oben mit einer gekerbten Längsöffnung versehene, auf einige Balken liegende Holzblöcke, welche, wenn mit hölzernen, bisweilen an einem Ende mit einem Knopfe von elastischem Gummi versehenen, Knüppeln geschlagen, einen dumpfen, weithin schallenden Ton von sich geben. Wir fanden dieses Instrument zwar nicht so ausgebildet, als es GUMILLA (II. Cap. 36. § 2.) bei den *Cavres* beschreibt, doch war unsere *Miranhas* übereingekommen, ihren Nachbarn durch verschiedene Schläge darauf Signale von Allem zu geben, was sie interessiren konnte. Kaum war im

Number on the Map	Tribes	Authors or Museum numbers
		Hafen unsere Ankunft gemeldet, so erklang aus der Ferne, von jenseits des Flusses derselbe Ton, und der Tubixava versicherte mich, dass in einer Stunde alle Mallocas der befreundeten *Miranhas* von unserer Gegenwart unterrichtet seyn würden. In den ersten Tagen, da das Interesse für uns noch ganz neu war, konnten wir Nichts unternehmen, ohne dass es durch den seltsamen Tontelegraphen weiter verkündet worden wäre. Bald ertönte es: "der Weisse isst", bald: "wir tanzen mit den Weissen" und in der Nacht ward angekündigt dess wir uns schlafen legten."
68	Omagua (Cambebas)	HERIARTE, p. 56. "Os instrumentos com que fazem suas festas, sacrificios e bailes, a que sâo muy inclinados, sâo trombetas de tristissimo som, feitas de TABOCAS, que sâo humas canas grossas ocas por dentro, e huns tambores de pau cavado por dentro, por ser o buraco pequeño, e com uns páos cobertos de resina os tocâo como atabales, que se ouvem muito longe."
	Cocama	FIGUEROA, p. 101. "Hicieron la señal de paz con sus tambores que son unos maderos gruessos y guecos por dentro, socabados con fuego, no todos de un tamaño, sino el uno mayor, que tendrá cinco baras de largo, que sirve de bajo; los demas van minorando hasta hacer como un coro ó juego de quatro ó seis tambores, que los tocan á la par juntos, y en ellos hacen varios sonidos á compás, con armonia que retumba y suena mucho."
98	Arandeuara or Manájé	LANGE, p. 219. "In the middle of the general clearing is a long trunk of the EMBA-UBA tree, hollow, and suspended to a horizontal branch by means of thin but very tough bush rope. Presently KARI-PETRO, — — — seizes two wooden mallets and goes over to the hollow trunk. — — Karl Petro now begins to beat the trunk, first with heavy blows at regular intervals, then quicker and fainter until the blows fade into a series of light taps." See Pl. facing, p. 221.

Number on the Map	Tribes	Authors or museum numbers
202	Guypunavi	Solano, p. 278. "Tienen en el cuartel la provision de armas y una caja de guerra hecha de un tronco de cierto arbol, cuyo corazon es blanda y su camisa dura, le vacian y luego cierran los extremos con tablas delgadas, es de tres ó cuatro varas de largo y tres cuartas de diámetro, le cuelgan tendido y levantado del suelo como una tercia y entre dos aberturas como las de la caja de un violin, pero proporcionadas á aquella vaten con dos mazos de resina elástica y su sonido se oye á tres ó cuatro leguas de ella, pero no le llevan a campaña y solo sirve para llamar la gente del pueblo que está en la sementera con toque diferente segun el porqué ó paraqué y en el acto de defensa del pueblo."
219	Chocó (Nonamá)	G. M. 27, 27, 465.
	Caverre	Gumilla, T. 2, p. 117—131. A very detailed description.
339	Indians of Rio Napo	Carvajal, p. 11. "Al cabo de dos leguas que habiamos ido el rio abajo vimos venir por el rio arriba cuatro canoas llenas de indios y requerir la tierra, y como nos vieron, dan la vuelta á gran priesa, dando arma en tal manera que en menos de un cuarto de hora oímos en los pueblos muchos atambores que apellidaban la tierra, porque se oyen de muy lejos. . ."
414	Aniana, and Yucuná	Ribeiro de Sampaio, p. 77—78, S. Mathias.
407	Girara	Rivero, p. 115.
408	Cara-Indians Otavalo	Juan Velasco, T. 1, p. 208. "La una es, la fabrica de esos mismos tambores de guerra que se oian en una increible distancia. Permanecen hasta hoy dos de ellos en el pueblo de Tusa, donde los he visto; uno ya dañado. que sirve de guardar cantidad de trigo, y el otro todavía entero. Es cada uno de una sola pieza de madera fortísima. grueso mas de cinco palmos de diametro, y largo al doble, con sus dos orejas para colgarse al aire.

Number on the Map	Tribes	Authors or museum numbers
		Es tan igual, y perfectamente cóncavo, con solas dos abertures estrechas y retorcidas como de violin, por las cuales no pueden entrar ni los dedos. Con qué arte é instrumentos hayan podido fabricarlos, no hay quien pueda enterderlo. El mayor de todos los tambores del Reino, al doble de los dos descritos, lo tenian colocado en la llanura de la provincia de Otavalo, llamada hoy TONTAQUI, por corrupcion, habiendo sido HATUN-TAQUI, que quiere decir el gran tambor de guerra. Era aquella la plaza principal de armas, donde se retiro el último Scyri, y donde ganó la batalla decisiva del Reino el Inca Huaynacapac."
	Cumana	RUIZ BLANCO, p. 65—66. "Se oye tres ó euatro leguas si el viento no es contrario" Schlitz-Trommel?"
415	Arauaki	BETENDORF p. 494.
0 4	Mixtek	SAVILLE, (With references), Teponatzlí.
0 5	Maya	» » » »
0 10	Zapotek	» » » »
0 16	Haiti	Teponatzli. OVIEDO y VALDES T. 1, p. 130, Pl. 1, fig. 5—6. LOVÉN, pp. 444—445. (2) JOYCE.
0 20	Aztek	After SAVILLE (With references), TEPONATZLI.
0 52	Quiché	» » » » »
0 53	Calchiquel	» » » » »

APPENDIX 6.

TABLE TO MAP 6.

The Carrying pole.

Number on the Map	Tribes	Authors
401	Cueva	OVIEDO, T. 1, p. 277. From this it is not clear whether the yoke was used on the Isla Española or on the mainland, but in the following quotation Oviedo makes it evident that he is referring to "provincia de Cueva ó en Gastilla del Oro. See LAM 2, fig. 8. (reproduced here).
022	Prov. (Chameda) Sonora 1531	OVIEDO, Vol. III, p. 574—575. "No se cargan aquellos indios en las espaldas, como los de la Nueva España, sino con balanças en un palo, como se dixo que lo acostumbran en la provincia de Cueva ó en Castilla del Oro, en los hombros, e llevan la carga ó parte della mejor diçiendo, una atras é otra adelante, en un palo ligero de si mesmo, tan gruesso como la muñeca del braço ó más, repartida la carga en dos partes, é cada una atada quassi al cabo de aquel baston, cerca de las puntas dél, é cuelga una red con la mitad del pesado de la una parte é otra de la otra, y en el palo sus muescas, donde andan asidas aquellas redes." OVIEDO, III, p. 574, "é dabanles treynta cargas de pescado fresco, ques cada carga de indio arroba é media de pesso." Indians were quite unaccustomed to carry heavy burdens on their backs. "Los indios que traian las cargas, como no sabian que cosa era cargarse en las espaldas de las petacas é pesso que les echaron llegaron á sus casas muy maltractados" . . . p. 575.
023	The Seri Indians	MC GEE, p. 184. "Ordinarily women are the water-bearers, each carrying an olla balanced on the head with the aid of a slightly elastic annular cushion, usually fashioned of yucca fiber (plate XXXII and figure 15), though in some cases two

Number on the Map	Tribes	Authors
		ollas are slung in nets at the ends of a yoke (figure 16) after the Chinese coolie fashion (this device being apparently accultural)."
Not on the Map	Indians, Rio Hastatlan	Primera relacion anónima de la jornada que hizo Nuño de Guzman á la nueva Galicia, p. 289. "Los ritos e cirimonias destos indios son como los de Xalisco, salvo que son grandes flecheros, y cargause diferente de los de Xalisco, porque toman un palo en el hombro y ponen la mitad de la carga en el un cabo del palo colgando, y de otro cabo otro tanto como peso, y asi caminan."
050	Indians, Villa de Coliacan	Segunda relacion Anónima de la jornada que hizo Nuño de Guzman, p. 305. "Esta villa de Coliacan se dice San Miguel: está poblada en un valle que se dice Horabá. — — Es gente bien tratada; carganse con aquellas balanzas que arriba tengo dicho."
Not on the Map	Modern Mexico	Oral statement by Dr. RIVET.

Map 6. Carrying pole. "Coolie yoke."

Map 7. Geographical distribution of pincers in Central and South America.

□ Pincers of mussel shells or wood used for removing hair from the body.

● Depilatory metal pincers.

■ Pincers of double-bent wood, used to remove hot bananas and other things out of the fire.

△ Pincers of split branches used to remove hot shells and other things out of the fire.

APPENDIX 7.

TABLE TO MAP 7.

Pincers.

Number on the Map	Tribes	Authors
3	Tapiete	R. M. L. 1. 105.
4	Chiriguano	G. M. E. 380; NORDENSKIÖLD (3), of silver.
5	Chané	NORDENSKIÖLD.
10	Araucanians	PISO et MARCGRAV Cap. I. Appendix p. 283. "Remove hair from the body with pincers of mussel-shells tied together."
27	Ona	GALLARDO, p. 171. "Para comer los mejillones y otros mariscos, los asan echandolos en la ceniza, cerca del fuego, de donde los sacan con una especie de tenaza llamada LAKEL con la cual también sacan la carne asada."
47	Macusi	ROTH, p. 419.
55	Carib	» » »
71	Sipibo	TESSMAN, pl. 17, fig. 9.
137	Achagua	RIVERO, p. 104. Pincers of wood used for removing hair from the body.
219	Chocó	G. M. 27. 27. 185. Pincers of wood, used for picking hot bananas and other things out of the fire. The Chocó Indians call them "tenaza".
364	Finds at Machu Picchu	EATON. Of metal.
367	Finds at Caldera	RIVET and VERNEAU, with references. Of metal.
372	Cuna	G. M. 27. 27. 1348.
380	Finds at Cartago, Cauca	RIVET and VERNEAU, p. 315 with references. Of metal.
404	Finds at Copacabana	RIVET and VERNEAU, p. 315, with references. Of metal.
405	Finds at Cobija	RIVET and VERNEAU, p. 315, with references. Of metal.

Number on the Map	Tribes	Authors
406	Finds at Paposo	RIVET and VERNEAU, p. 315, with references. Of metal.
A	Finds on the Coast of Peru	RIVET and VERNEAU, p. 314, with many referenees. NORDENSKIÖLD ( ), with many references.
8 A	Mayoruna	SOVREVIELA, p. 433.
E	Finds Northern Argentine	AMBROSETTI (1).
J	Finds at Manabi	RIVET and VERNEAU, p. 314, with referenees. Of metal.
0 17	Finds in Chiriqui	RIVET and VERNEAU p. 314, with references. Of metal.
0 34	Guatuso	LEHMANN.
0 35	Michuacan Mexico	SELER T. 3, p. 86. "Wenigstens finden wir ihrem Wortschatze die Pinzette *Vandugua*, "tenazuelas para eejas" — — — angegeben und bei der Beschreibung der Tracht und der Ausrüstungsstücke der Priester wird regelmässig ein um den Halz gehängt su tragendes goldenes Zängchen erwähnt."
0 55	Rama	CONZEMIUS, p. 110. "Ums Feuer herum liegen einige langarmige Holz-Zangen (*kǐskǐs*), die aus dem Zusammengebogenen Stamm eines Kleinen Palmenart, eaña danta, *atak* (*kǐskǐs*) hergestellt sind."

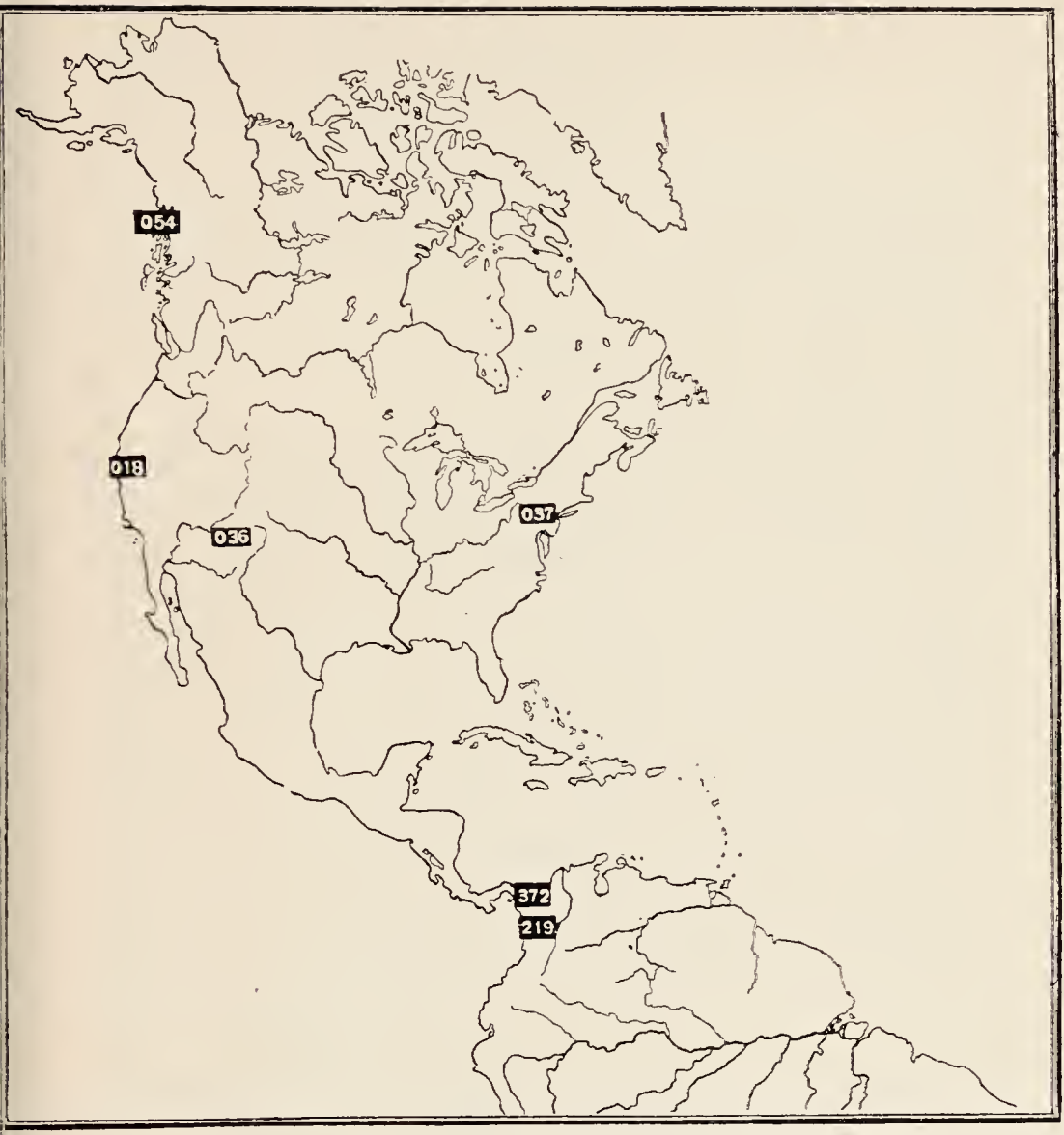
Map 8. Sugar-mills of Indian type.
■ Used by the Indians.
□ » » » negroes.

APPENDIX 8.

TABLE TO MAP 8.

Sugar-mill.

Number on the Map	Tribes	Authors or museum numbers
32	Chama	NORDENSKIÖLD (2).
47	Taulipang	KOCH-GRÜNBERG (2), T. 111, Abb. 3. Thulin. Photo.
55	Carib	ROTH, p. 301.
		BRETT 31. "Some of the Indian "places" have a rude apparatus for extracting the juice of the sugar cane — a sort of mill with small rollers being used by the more advanced. Another kind which I saw used by the Caribs was very primitive. It consisted of a thick post, the upper part of which was carved into a rude resemblance of a human bust. The cane was placed on the part answering to the collar-bone, and crushed there by a long lever or staff inserted in a hole through the neck, and worked by hand, the sweet juice flowing down the breast into a vessel placed to receive it."
71	Sipibo	TESSMAN T. 12, fig. 7, 8.
79	Yekuaná	KOCH-GRÜNBERG (2), T. 111, Abb. 3.
246	Tunebo	ROCHERAUX fig. 5 a.
358	Atorai	ROTH p. 301, (after COUDREAU).
372	Cuna	
413	Negroes	Bakhuis p. 734.
1 B	Tucuna	Letter from NIMUENDAJÚ.
2 M	Wapisiana	ROTH, p. 301, (after COUDREAU).
7 S	Arawak	ROTH, p. 301.
8 X	Warrau	» » »
0 21	Mosquito	CONZEMIUS, letter from.
0 55	Rama	» p. 312.
0 62	Negroes	» , letter from.



Map 9. Distribution of the Pump-drill.

APPENDIX 9.

TABLE TO MAP 9.

Pump-drill.

Number on the Map	Tribes	Authors or Museum numbers.
219	Chocó	G. M. 27. 27. 470.
372	Cuna	G. M. 27. 27. 1346.
o 18	Pomo	KROEBER p. 250.
Not on the Map	Indians of the Round Valley	MC GUIRE p. 737. "Fig. 176 shows a curious drill and unique in the collection of the U. S. National Museum, The figure well illustrates the character of this drill, which is worked by moving the disk, which has free play up and down the shaft, as the bow is ordinarily used with the pump drill. The point is of iron, the shaft of extremely heavy wood; a long string or thong is drawn tightly over the shaft. It would, however, answer equally well were it carried through an eye at the head of the shaft, as is so often done with the shafts of pump drills. Each end of the thong is then passed through a hole on opposite sides of the disk and tied near the bottom of the shaft in such a manner that as the disk is pressed the shaft revolves and winds the string on the upper part of the shaft as the disk descends. The pressure being relieved, the weight of the shaft causes it to revolve from the impetus given, thus tightening the string on the bottom of the shaft until the pressure is again brought to bear on the disk. The string is kept taut, which enables the drill to work with some ease. It revolves little if any faster than would the straight shaft held between the outstretched palms, and only cuts as the downward stroke is given, as with the shaft drill; yet the facility with which this drill works gives it interest, as it is used by the natives of a large tract of country.

Number on the Map	Tribes	Authors or museum numbers
		This interesting drill was collected by Mr. N. J. Purcell, at Round Valley Agency, Cal., and is used for drilling small holes through hard white shells. The writer is informed by Mr Purcell that he has seen the Concaw, Ukie, Little Lake, Redwood, and Pitt River Indians all work with this tool. They now use, he says, the points of files to the drill, where formerly they used stone point. After the drill has started, one hand is used to hold the shell and the other to work the drill by moving the disk up and down. The shaft is in no way weighted; the strings are made of the inside bark of a weed which grows in rich, damp glades (probably the Indian hemp). This drill may be made to make from seventy to ninety revolutions a minute, and the only redeeming quality it possesses is that it leaves one hand free to hold whatever it is that is to be bored. In order that this drill should work to its best advantage, it will be appreciated that the string should be taut, the disk should have sufficient play to move freely, and the holes in the disk of a size to allow the strings to run easily, and the shaft should be of heavy wood."
s 36	Pueblos, especially the Zuñis and Moqui	Mc Guire, p. 733, fig. 170. Stone whorl and flint point.
o 37	Iroquois	Mc Guire, p. 734; Parker.
s 54	Tlingit	Mc Guire, p. 734, after Emmons.
North-ern Asia	Chukehi	A. E. Nordenskiöld. Vegaresan, Vol. II, p. 125.

Map 10. Distribution of whistling arrows and darts.

APPENDIX 10.

TABLE TO MAP 10.

Whistling arrows and darts.

Number on the Map	Tribes	Authors or museum numbers
13	Carajá	KRAUSE, p. 306, fig. 165. Arrows, made like whistling arrows but not whistling.
28	Bakaïrí	KARL VON DEN STEINEN p. 229. Arrows for bow and throwingstick.
30	Guayaqui	MÉTRAUX (1), p. 284. Arrows for bow.
39	Goajiro	G. M. 24. 2. 322. » » »
67	Suyá	MEYER p. 562. » » »
71	Sipibo	TESSMAN p. 42. » » »
98	Tembé	LANGE. Plate facing, p. 228.
333	Cuevas	OVIEDO III, p. 127, arrows for throwing-stick. "Algunas varas destas van silvando en el ayre, á causa que les haçen çerca del extremo çierta oquedad ó poma redonda, é por la oquedad de aquella é agugeros que tiene, assi como la echan y es tocada del ayre, assi va luego por lo alto con ruydo silvando. Y estas tales que silvan, usan dellas en las fiestas, quando braçean por gentileça, é no en la guerra, porque las tales, con aquel sonido ó silvato avisan al enemigo, é quando en la guerra de un real á otro las tiran, ó de noche, es como en caso de menospreçio de los contrarios."
340	Indians on the Amazon River	OVIEDO IV, p. 561. Arrows for bow.
354	Arara	MEYER p. 562. » » »
355	Indians Rio Tapajos	MEYER p. 562. » » »
356	Indians Rio Tocantins	MEYER p. 562. » » »
368	Yuruna	KLETKE p. 681. » » »
o 12	Eskimoes Ammassalik East Greenland	THALBITZER p. 437. "According to Johan Petersen a narrow thong with two bone beads on it lay along the wooden shaft of the old-time bird darts of Ammassalik, these made a whistling or hissing sound."

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